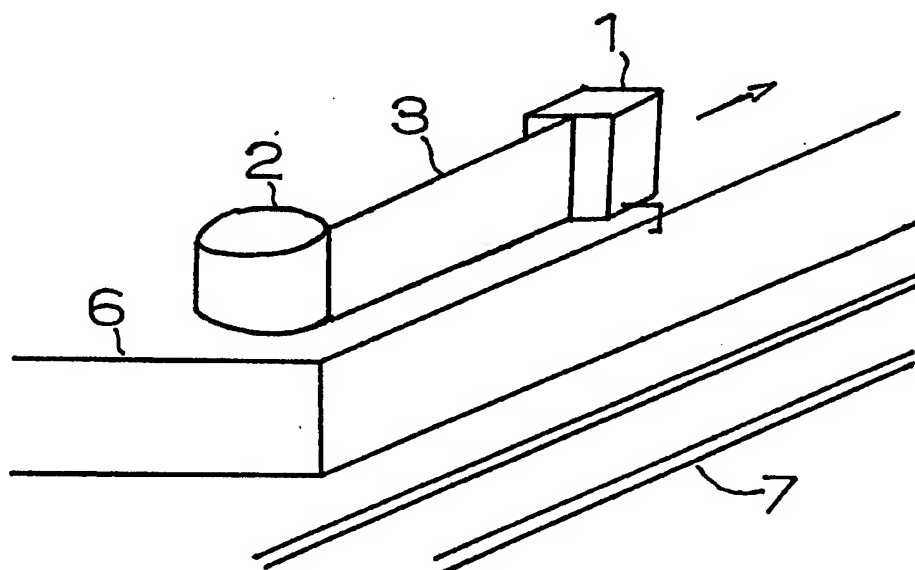




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : <b>B61B 1/02</b>	<b>A1</b>	(11) International Publication Number: <b>WO 97/07005</b> (43) International Publication Date: 27 February 1997 (27.02.97)
(21) International Application Number: PCT/JP96/02306 (22) International Filing Date: 14 August 1996 (14.08.96) (30) Priority Data: 7/245056                      18 August 1995 (18.08.95)                      JP (71)(72) Applicant and Inventor: HIRANO, Yoshitaka [JP/JP]; 106 banti-207gou, Hirabari 1-chome, Tenpaku-ku, Nagoya- shi, Aichi 468 (JP).		(81) Designated States: CN, JP, KR, SG, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.</i> <i>With amended claims and statement.</i>

(54) Title: A SAFETY DEVICE FOR A PASSENGER ON A PLATFORM



## (57) Abstract

The present invention is a safety device for a passenger on a platform of a railway which comprises mainly filmy things (3), means (1) for carrying the filmy things (3) and means (2) that has the filmy things (3) within. Means (2) can be called means (2) for forwarding the filmy things (3). Present invention can stretch the filmy things (3) around the platform so that the filmy things (3) can isolate the passengers from a train that passes through the station with high speed.

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### Specification

A safety device for a passenger on a platform

### Technical field

Present invention is to protect passengers ,especially children, on a platform from passing train.

### Background art

In some stations for super express "Hikari" , the platform is enclosed with an iron fence for the purpose of protection of passengers . And automatic doors are set.

Iron fences isolate the passengers on the platform from passing super express "Hikari" . Through the automatic doors, passengers can get on and off super express "Hikari".

Above method leads us to an expensive cost of construction.

In particular , to enclose a concrete platform with an iron fence , it is expensive. In a newly-established railway station , it may be problem only about a cost .

However, in already constructed railroad station , such construction of iron fence causes passengers inconvenience within a term of construction ,because we must carry out the construction operating the railroad station.

JP-A05-246331, JP-A06-239223, JP-A06-255491, JP-U06-1417 and JP-U06-57764 is a relevant prior art.

### Disclosure of invention

When a train approaches the station, means 1 for carrying the filmy things 3 operates in advance and stretches the filmy things 3 vertically along the edge of the platform.

The detection of the approach of trains owes to an automatic train control <ATC> or centralized traffic control system <CTC> . To put into simply, it is the same that a lifting gate operates automatically at a railroad crossing when a train approaches. After the train has passed the station, the filmy things 3 is wound back and removed from the platform.

[In the following sentences, simplified expression is used.  
Namely, "means 1" is means 1 for carrying the filmy things 3 .]

As mentioned above, present invention is a safety device for protection of passengers on a platform of railway station from passing train, comprising filmy things 3 , means 1 for carrying the filmy things 3 , means 2 that has the filmy things 3 within, and a central processing unit 5 which controls the movement of means 1 and means 2 so that the filmy things 3 keeps an enough tension to repel infant passengers when the filmy things 3 are stretched along the platform. Fig.1, Fig.2, Fig.8 .

[In the following sentences, simplified expression , cpu 5 , is used instead of central processing unit 5.

Also , "means 2" is used instead of means 2 that has the filmy things within.]

The means 1 has such mechanism as an automatic carrier or a car of automated material handling system.

Namely, means 1 has at least motor 71 and its wheels 72 to go ahead and go back .Fig.5.

The means 1 has limit switch 11 for detection of passengers and baggages so that the danger from the movement of means 1 to passengers does not arise. Fig.5 .

For the same purpose, the means 1 has also infared sensors 38, 38'.

Unit 9 for regenerating voice messages is also set on means 1 like Fig.14 from the same point of view.

< Means 31 corresponds to means 1. >

Television camera 39 can also be set on means 1 so that station employees can grasp the situation around the means 1.

Means 2 has at least motor 73 and the filmy things 3 is wound on an axis 4 of the motor 73. Fig.6.

A rotation of the motor of means 1 and means 2 is controlled by cpu 5. Fig.17, Fig.20.

When the filmy things 3 is stretched , tension value of the filmy things 3 is detected with tension meter 41 or tension sensor 41 so that the filmy things 3 does not slacken and tear. We can realize the same purpose in other example.

Instead of means 1, we can use a gravity of a stick 13. Filmy things 3 can be moved up and down by rotation of the motor 73. Filmy things 3 is wound on the axis 4 of the motor 73.

In such case, the tension is given by a stick 13 which is connected to one end of the filmy things 3. Fig.9, Fig.10, Fig.26.

Another example can also be realized.

Instead of means 1, we can use an electromotive curtain. Fig.11, Fig.27, Fig.28, Fig.29, Fig.30.

In such example, means 1 is unnecessary. Curtain 3, namely, filmy things 3 is moved by curtain driving motor 75 which is on line connected to cpu 5.

In these example, cpu 5 is also connected with ATC or CTC.

Such system becomes better, if it is used on a platform that is often crowded by passengers. For means 1 is unnecessary.

Means 1 may become nuisance of passengers, if the station is crowded.

Considering an influence of natural wind and wind pressure by passing train, pure net 3' can be used instead of the filmy things 3. The mechanism for carrying the net

< it corresponds to means 1 >

and the mechanism that has the net within

< it corresponds to means 2 > can be designed in a body < it is called means 31 > so that we can get rid of the danger which arises in the case that children thrust their fingers into the net. In such example, one end of the net is fixed with tension meter 41 which is supported by stick 30 as in Fig.13 .

For already stretched net does not move in such design .

Such mechanism for prevention of wind or wind pressure is also possible about abovementioned example which uses a mechanism of electromotive curtain. Fig.32, Fig.33 .

Brief Description of the drawings

Fig.1 is a perspective view of present invention.

Fig.2 is a side view of means 1 for carrying a filmy things . Means 1 moves , detecting the edge of the platform by limit switch 8.

Fig.3 is an example of enforcement in the long platform. The position that the filmy things is connected to means 1 is a little different from that in Fig.1 . Such position can be variable according to the condition of platform.

Fig.4 is an example in a curved platform.

Fig.5 is a side view of means 1 which is fixed firmly with hook 10 at the projection 16 on the platform 6, when means 1 reaches the end of the platform.

Fig.6 is a <sup>a</sup>digital view of means 2 that has a filmy things within tries to rotate reverse direction . Therefore , tension arises on the filmy things 3.

Fig.7 is a top view of means 2 . After a stretch of filmy things 3 , filmy things 3 can be supported also by robot arm 21.

For a easy understanding, only point is drawn about robot arm 21.

Fig.8 is a diagonal view that filmy things 3 is being wound back.

Fig.9 is an example that filmy things 3 is stretched up and down.

Fig.10 is a view that a stick 13 on the end of the filmy things 3 is put firmly by robot hand 26, when the stick 13 reaches a platform.

Fig.11 is an example that filmy things 3 moves horizontally by the mechanism of an electromotive curtain .

Fig.12 is an example that strips of filmy things is used for prevention of natural wind or wind pressure by passing train.

Fig13 is an example that means 2' is built-in a body of means 1, that is to say, means 31. In this case, meshes of filmy things 3'' does not change their positions when means 31 moves.

The inside of means 31 is drawn mainly with the mechanism of means 2' ,namely, motor 73 and the axis 4.

X

Fig.14 is a means 31 drawn in detail. For detection of man, infrared sensor 38, 38' are set on means 31.

Television camera 39 is also set on means 31 for remote monitoring. This television camera is rotatable.

The inside of means 31 is drawn mainly with the mechanism of means 1, namely, motor 71.

Fig.15 is a flow chart about movements of means 1 and means 2 when limit switch 11 for detection of man or baggage becomes on and off.

Fig.16 is means 1' for supporting the filmy things 3.

Fig.17 is a flow chart about a movement of means 2 when a tension detected by tension meter 41 changes various values.

Fig.18 is a side view that limit switch 8 becomes off when means 1 approaches excessively the edge of platform.

Fig.19 is a top view that each means 1' stands near the positions of the couplers of train 42.

Fig.20 is a flow chart about a movement of means 2 for the purpose of sufficient tension of filmy things 3.

Fig.21 is a front view of filmy things 3 which is supported with beams 51 of steel.

Fig.22 is a filmy things 3 that is supported with net 52 of carbon fire or wire net.

Fig.23 is a top view of means 1 whose shape is suitable for pushing aside an obstacle 43.

Fig.24 is an other example of means 1 for the same purpose.

Fig.25 is a top view of means 1 and the train 42 coming into a platform. On the platform 6, filmy things 3 is removed in order, from the section which train 42 comes into.

Fig.26 is a detail side view of Fig.9 . On the beneath of stick 13, limit switch 11 is also set.

This limit switch 11 has the same length as stick 13 , that is to say, this limit switch is long in horizontal direction .

Of course, collection of short limit switch will do.

Fig.27 is a diagonal view of the example which uses the principle of an electromotive curtain . The curtain cloth is made of pure net or filmy things which is supported with net. Tennis net or net of flaxen string or net of carbon fire is used for the net. The system has an inverse "L" type curtain rail.

Fig.28 is a diagonal view of the example which also uses a principle of an electromotive curtain . The curtain clothes is made of filmy things which is supported with beams .

The beam is steel or stainless steel or carbon fiber or flaxen string.

The system has curtain rails of vertical poles.



Fig.29 is a diagonal view of the system which uses the principle of an electromotive curtain . The curtain moves horizontally. The curtain rail of lower side 62 is set just on the edge of platform 6. Just above the curtain rail 62 , namely, beneath the ceiling of the platform, a curtain rail of upper side 61 is set. Please see also Fig.31 .

The principle of Fig.29 is the same as that of Fig.11 .

However, the layout is different .

Fig.30 is a top view of the system of Fig.29 . This example has inverse "L" type curtain rail < seeing from the top>.

The curtain can be neatly folded at the end of the platform, as a folded curtain 54.

Fig.31 is a side view of the curtain rail of lower side .

Its "mouth" of rail turns horizontally. An influence of dust becomes very little. Further, the influence of passengers or baggages becomes very small under such execution of a curtain rail.

Fig.32 is an example which pure net is used. Already stretched meshes near our hands does not move even when moving part 31' goes up and down near our feet. So it is safer.

For easy understanding, moving part 31' is drawn without external case unlike means 31 in Fig.13 .

Fig.33 is an another example which pure net is used.

Even when moving part 31' moves at the right side of platform to stretch net 3'', already stretched meshes on the left side of platform does not move.

Fig.33 is drawn typically like Fig.32 .

Fig.34 is a flow chart about a movement of means 1, a unit 9 for voice regeneration and a handling of the data of television camera 39 when limit sensor 11 and an infrared sensor 38 operates.

Fig.35 is a schematic diagram of components of invention.

Fig.36 is a typical view of means 1 and means 2 when a passenger 79 leans on the filmy things 3. Means 1 is equipped with light projector 77 . Light detector 78 is put on one side of the means 2.

Fig.37 is a top view of means 1, means 1' and means 2 when light projector 77 and light detector 78 are used.

Means 1 of Fig.37 has a different shape from that of Fig.36 .

Explanation of the marks is as follows.

- 1 : means for carrying a filmy things .
- 1' : means for supporting a filmy things.
- 2 : means that has a filmy things within .
- 3 : filmy things .
- 3' : filmy things which is made of several strips.
- 3'' : filmy things made of net .
- 4 : axis of rotation.
- 5 : central processing unit.
- 6 : platform .
- 7 : railroad line.
- 8 : limit switch or microswitch for the detection of the edge of platform.
- 9 : unit for regenerating voice
- 10 : hook which is used among a stop of means 1.
- 11 : limit switch or microswitch or touch sensor for the detection of man or baggages.
- 11' the same above
- 11'' the same above .
- 13 : stick on the lower end of the curtain ( filmy things 3 ) .  
The stick is used for fixing of the curtain.
- 16 : projection on a platform . The projection is used for fixing of means 1.
- 21 : robot hand or robot arm on the means 2 for fixing of filmy things 3.

22: direction of torque of the axis 4.  
23: direction of an extension of the filmy things 3.  
26: robot hand or robot arm for fixing of stick 13 on the lower end of curtain ( filmy things 3 ).  
30: stick for fixing of the filmy things 3.  
31 : means 1 that means 2 is built-in .  
31': the same above.  
38: infrared sensor < human detection sensor >.  
38': the same above.  
39: television camera.  
41: tension meter or tension sensor or weight meter or weight sensor.  
42: train.  
43: obstacle on the platform ,for example, a baggage.  
51: beam for support of filmy things 3.  
52: net for support of filmy things 3.  
53: pole for prevention of swing.  
54: folded curtain or folded filmy things.  
61: curtain rail of an upper side.  
62: curtain rail of a lower side.  
63: curtain rail of a left side  
64: curtain rail of a right side.  
71: motor of means 1.  
72: wheel .  
73: motor of means 2.  
74: vacant space or elongated opening.  
75: motor of electromotive curtain.  
76: storage battery.  
77: light projector  
78: light detector  
79: passenger who leans on the filmy things 3  
80: light from light projector 77 to light detector 78

Best Mode for embodiment

A thick vinyl sheet or net like a tennis net or net of carbon fiber can be used for the filmy things 3.

In a construction cite, vinyl sheet is sometimes used for prevention of falling of man. Such vinyl sheet is made of vinyl and built-in cloth. Such sheet is tolerably strong.

We can use whatever can be proof against enough tension to repel, even if an infant push it, and can be wound to axis of rotation. Accordingly, we can also use, for example, a cloth of flax or plastic film like a rejected article of magnetic tape for computer or sheet by same material as an air bag for a car. To avoid an influence of wind or wind pressure by train, things like net with large meshes, [ "large" means 5 mm ~ 5 cm ], can be used for filmy things 3.

For example, net made of flaxen string can also be used for filmy things 3.

We can also use vinyl sheet or nylon sheet that is supported with beams < like a beam of umbrella > or net of carbon fiber as in Fig.21, Fig.22.

Means 1 is at least equipped with a electric motor 71, wheels 72 and storage battery as a source of energy.

An automatic carrier or a car for automated material handling system can be used for means 1. Robot car or robot can also be used for means 1.

Means 2 is equipped with an axis 4 on which the filmy things 3 is wound and a motor 73 which rotates the axis 4.

There are several stations at which limited express or some ordinary expresses do not stop and passes with high speed.

Such train is very dangerous to passengers on a platform.

The purpose of present invention is to decrease such danger.

When the approach of such train is detected from a signal of ATC or CTC, cpu 5 gives a signal "Stretch the filmy things" to means 1.

Means 1 starts to stretch the filmy things 3. Fig.1.

If means 1 has a sound recognition unit on which the sounds of target trains is registered , means 1 can also detect the approach of trains, even if ATC or CTC is not used.

Means 1 has microswitch 11 or limit switch 11 or touch sensor 11 and can stop automatically when means 1 touches person or objects .Fig.5 . The whole of front [ seeing from the direction of going of means 1 ] surface is limit switch 11.

Means 1 also has a unit 9 for regenerating voice.The unit 9 comprises speaker and tape-recorder or IC on which such voice message as "Please step back" is registered.Fig.2 .

When a person or object is detected by the limit switch 11 of means 1 , cpu 5 regenerates the voice message registered on the unit 9.

Such voice system is old in an on line banking system for automatic payment.

After a person steps back or the object is removed , the microswitch 11 or limit switch 11 detects it and means 1 again begins to carry filmy things 3.

Fig.15 shows the flow chart of above situation.

In Fig.15,"limit switch is on" means the switch detects man or baggage.

"On" does not mean a mere power on. The same thing is said in Fig.34.

Means 1 and means 2 move at the same time and stop in the same instant for the purpose of keeping the tention of filmy things 3 under the control of cpu 5. Accordingly, the filmy things 3 is not loosened.

Means 2 winds the filmy things 3 off synchronizing the movement of means 1.

In this way, filmy things 3 is stretched vertically around the platform. See Fig.1 .

Means 1 has a tension meter 41 built-in. Please see Fig.5. Tension sensor 41 or weight meter 41 or weight sensor 41 can also be used for means 1.

Means 2 enables the filmy things 3 to have a tension which can repel always even if a child pushes the filmy things 3 by hand or body.

For the movement of means 2 is controlled so as to keep the same level of the tension meter 41. Usually, the level of the tension is kept between 20 ~ 40 kg among the stretch of the filmy things 3. Of course, the value of the tension can be kept between 40 ~ 80 kg. In general, the higher the tension is, the better the filmy things 3 repels children. Such value of the tension depends on a tensile strength of the filmy things 3. If the filmy things 3 can bear high tension, the latter example < 40 ~ 80kg > is used. If not so, the former range is used.

After the the extension ( stretch ) of the filmy things 3, means 1 stops. Among the stop of means 1, if the tension meter goes over pre-set max value, for example 40 kg, it means that someone pushes filmy things 3 or there is a wind pressure by passing train or natural wind.

Cpu 5 has an information of the passing trains from ATC or CTC or sound recognition unit.

So cpu 5 can recognize whether it < i.e. excessive tension > owes to a wind pressure by passing train or not.

An anemometer or other wind sensor can also be set and on line connected to cpu 5. So cpu 5 can also recognize whether it owes to natural wind or not at the same time.

If it is recognized that someone pushes filmy things, the cpu 5 regenerates the voice message such as "Never push the filmy things".

When means 1 moves, the movement of means 1 and means 2 is controlled by cpu 5 as in Fig.17.

Describing more detail about Fig.17, if the condition of higher tension lasts after several voice messages such as "Never push" and the tension approaches the threshold value that the filmy

things 3 tears , ' the velocity of rotation of means 2 goes up' .  
As told later, such case can be informed by cpu 5 and confirmed  
by station employee through television camera 39.

In present specification, tension of 30 kg means that the  
tension can support the weight of 30 kg.

Means 1 walks the same speed as a man , for example, 1 ~ 3 m/s  
. Means 1 can usually move 2 m/s .

When excessive tension that the filmy things 3 tears is  
detected, the tension is relieved by means 2 as in Fig.17  
under the control of cpu 5. So the tension is controlled among  
the pre-set proper range. Such high tension can also be relieved  
even by the movement of means 1.

< Such threshold value is much larger than 'pre-set max value'. >

If such excessive tension lasts more than 3 sec , cpu 5 have  
means 1 lower the velocity to , for example, 1 m/s or stop.

Means 1 moves with a certain distance to the edge of the  
platform , detecting the edge of the platform by microswitch 8  
or limit switch 8. Please see Fig.2. If means 1 approaches the  
edge of platform to excess , the limit switch 8 becomes off.

Such situation means the possibility that means 1 falls down the  
platform. The orbit of the means 1 is mended so as to go away  
the edge of the platform. Please see Fig.18 comparing with Fig.2

. ( Above "certain distance" is 30 cm ~ 1 m .

It is decided by the condition of the platform . If high speed  
train like super express "Hikari" passes the station , 1 m will  
do , considering not a little wind pressure.

If only low speed train whose velocity within 50 km/hour passes  
the station, even 30 cm will do.

If there is a train that passes through the station without  
stop , the distance of 30 cm will be necessary , considering the  
wind pressure of the train ). Main target of present invention  
is a train that passes through the station with high speed.

If every train stops the station , there is no influence of wind  
pressure by passing train, the distance 0 or 1cm is ok.

Though an influence of natural wind should also be considered .

In the case that the platform is long as in Fig.3, means 1 of two and upward ( plural means 1 ) are used . In such a case, second and third ... means 1 play the part of the means for vertical support of filmy things , namely , means 1'.

Means 1' has the same equipment as means 1 other than tension sensor 41. Means 1' has a thin vacant space 74 or elongated opening 74 through which the filmy things 3 passes. Fig.16 . Means 1' as a means for vertical support of filmy things have their positions at the couplers of train 42 so as not to obstruct the passengers waiting trains. Please see Fig.19 .

When the length of train is L, the interval between one means 1' and another means 1' becomes L or 2xL or 3xL... . According to the kind of train, for example, limited express, ordinally express , slow train and "Where is the train bound for ?" , each train stops the fixed position of the platform.

Such data can be programmed into cpu 5. Therefore, every means 1' for a vertical support of filmy things 3 can stop at the position so as not to obstruct the passengers, namely, at the position of the couplers..

When means 1' is not equipped with cpu 5' of its own , motor of means 1' and other components of means 1' are controlled by cpu 5 of means 1. When means 1' is equipped with cpu 5', all components of means 1' are controlled by cpu 5'. Either will do. In a case that the platform curves as in Fig. 4, means 1 of two and upward ( plural means 1' ) are also used. Accordingly, filmy things 3 is stretched just sufficiently along the edge of the platform.

Means 1 carries filmy things 3 parallel to the edge of the platform and moves from one end of the platform to another end . Means 1 detects the distance of march by the number of rotation of its wheel 72. Or , means 2 detects the number of rotation of the axis 4. < Further, means 2 can also detect the last rotation that filmy things 3 is completely wound off >. So cpu 5 can recognize that means 1 reaches the "another end" of the platform.



When means 1 reaches another end of the platform , a brake [ not illustrated ] built-in means 1 operates and hooks built-in means 1 catches a projection set on the end of the platform as in Fig.5.

Means 1 has several hooks and their hooks catch projections at more than three places.

In this way, means 1 is fixed completely.

At the same time, under the control of cpu 5, means 2 operates so as to pull the filmy things as in Fig.6 . Therefore, filmy things 3 is stretched tight. Please see Fig.20.

For the same purpose, robot arm 21 built-in means 2 as in Fig.7 can fix filmy things 3 tight.

For cost down, we can omit the robot arm 21.

Describing more detail about Fig.20, means 2 so operates that motor 73 rotates forward direction to make loose the tension , if the tension reaches the threshold value which the filmy things 3 tears after several voice announcements by the unit 9 for regenerating voice , when someone pushes or leans on the filmy things 3.

If the tension does not reach such threshold value , means 2 keeps as it is. Accordingly the filmy things 3 can repel someone who pushes or leans.

The height of filmy things 3 is about 1 m.

Main purpose of this system is to protect small children.

They can not recognize the danger of passing train , though an announcement such as "Caution for passing train" is broadcasted on the platform.

The height of filmy things 3 can be over 1m, for example, 1.5m , in particular, if transparent filmy things 3 is used.

When the distance between the filmy things 3 and an edge of the platform is small , for example, 0 ~ 30 cm , transparent filmy things 3 should always used so that passengers can confirm the edge of platform for safety .

After the train which does not stop has passed the station, filmy things 3 can be wound back and removed from the platform.

In the above system, we can decrease the danger that comes from the train which does not stop the station and passes through the station with high speed.

However, if cpu 5 keep the filmy things 3 stretched around the platform until the next train that stops at the station comes, we can prevent small children waiting the next train from falling down the platform by chance when they are wandering about.

For above purpose, filmy things 3 is always kept stretched except the following cases.

<Case 1> Filmy things 3 is wound back , namely , removed as soon as or just before a train that stops at the station arrives at the station.

<Case 2> Filmy things 3 is streched again around the platform as soon as or just after the train starts from the station. When filmy things 3 is wound back, means 1 goes back parallel along the edge of the platform from another end of the station to one end. At the same time, means 2 winds back the filmy things 3 as in Fig.8.

[ "One end " is the place where there is means 2 .]

In this case , the control showed as in Fig.17 is also done by cpu 5.

Movement of means 1 and means 2 are controlled by cpu 5 so that filmy things 3 does not slacken and does not tear.

Present system is suitable for a protection of the passengers, in particular, children and blind person, on the platform of the unmanned railroad station through a remote monitoring.

As trains runs to a set time schedule, such time schedule can be used for the operation of present system.

Namely, such time schedule can be programmed into the cpu 5.

Further, the connection of cpu 5 and automatic train control system or centralized traffic control system can give present system the signal about an approach of trains.

Therefore, present system runs punctually on real time, even if the schedule of trains is disrupted.

When means 1 detects an obstacle by its microswitch 11 or limit switch 11, the signal of the detection can be transfered to the room of station master, for example, as a lighting of the private lamp or sound of the private buzzer or voice message.

If the station is unmanned, the signal is transfered to control center of trains. In both cases, the feedback of the station employee to the passengers on the platform can be expected, for example, by broadcast in the platform.

A use of television camera is also effective in such case to confirm the situation.

Now, television camera is widely used in the railway stations.

If the shape of means 1 is as in Fig.23 or Fig.24, means 1 can go ahead, pushing aside the obstacle 43.

In particular, if the obstacle is recognized as not a person through television camera, means 1 can push aside it after the indication by station employee to cpu 5.

As television camera serves the purpose of eye, filmy things can serve the purpose of hand to children and the blind for a station employee who stands on remote cite.

When the train that stops at the station comes into the platform, the filmy things must be removed quickly. In Fig.25, such situation is drawn with the direction of train 42.

Just before the train comes into the platform, means 1 goes back former position, namely, by the side of means 2.

[ When the train arrives at the station , the platform may be crowded by passengers. Therefore, cpu 5 had better remove the filmy things 3 a little earlier. When the train 42 starts from the station, the platform is not crowded. Therefore, cpu 5 can stretch the filmy things 3 as soon as the train 42 starts. ] CPU 5 is set in the inside of the means 1 or is built in the means 2. Means 1 and means 2 are connected by wireless lan. Of course, means 1 and means 2 can be connected through wire. In such case, signal cable for connection is wound up or released as well as filmy things 3.

As in Fig.35, each components are connected to cpu 5.

By the way, if we set light projector <sup>7</sup>7 on rear side of means 1 and light detector 78 on one side of the means 2 , direct detection of someone who leans on the filmy things 3 becomes possible. An infrared ray , for example, is used for the purpose. If a passenger 79 do not lean on the filmy things 3, there is no obstacle between light projector 77 and light detector 78 . So the light from light projector 77 is detected completely by the light detector 78. If not, the light to light detector 78 is cut . Accordingly, a passenger 79 who leans on the filmy things 3 is detected. Fig.36.

Such sensor system which comprises light projector 77 and light detector 78 is old in Japan and is used for automatic on and off of escalator. Such sensor system is in particular valid in a straight platform.

Such sensor system can also be used for mending of the orbit of movement of means 1 in a straight platform. If the direction of means 1 slips, the light from light projector 77 can not be detected by light detector 78. So the control of the direction of means 1 is done by cpu 5.

We can set light detector 78 on one side of means 1' and light projector 77 on the reverse side of means 1' in a long platform as in Fig.37 .

In above example of enforcement, means 1 for carrying the filmy things is used.

However, in the platform that is always crowded by passengers, the use of means 1 may become a nuisance to passengers.

If a railroad line is straight, a curtain can be drawn automatically up and down as in Fig.9 .

Such curtain 3 can produce the same effect as the filmy things 3 in Fig.1

In such case, stick 13 of the end of the curtain can be fixed with robot arms 26 as in Fig.10 when the curtain falls down completely. The stick 13 is set on the end of the curtain so as to be caught by robot arm 26.

If the number of rotation of the axis 4 becomes pre-set value , cpu 5 can recognize that the curtain falls down completely and can give a signal "grasp the stick 13" to the robot arm 26.

In this way, curtain is stretched tight so as not to swing.

In this case , by limit switch 11 set under the stick 13 , cpu 5 can detect an obstacles or man as in Fig.26.

If several poles 53 stand just before the curtain < that is to say, between stick 13 and the edge of the platform >, we can prevent a swing of stick 13 even among the movement of up and down of curtain 3.

For cost down, we can omit the robot arm 26.

In above case, axis 4 , namely, motor 73 is set below the ceiling of the platform.

Transparent curtain , for example vinyl curtain, may be used.

In the place where there is no wind like subway, that may be easy to be put into practice. Further, enforcement of this type becomes cost down. For "means 1" is not necessary.

Gravity plays the part of "means 1".

In this case, curtain goes down the position that is 0 cm ~

30 cm from the end of platform. As means 1 is not necessary , the space around the edge of the platform can be widely used.

In the platform that is often crowded by passengers, 0 or 1 cm

may be ok , in particular, if every train stops the station.  
In the long platform, present system of two and upwards ( plural systems as in Fig.9 ) are connected . Each curtain is also kept parallel to the edge of the platform.

The horizontal lenth of the system as in Fig.9 becomes  $L$  or  $2xL$  or  $3xL$  ... , when the length of the body of train is  $L$ .

In subway, definite type of trains runs . Accordingly, the curtain system of horizontally fixed length will do.

Even in the platform curved a little < considering that the body of train is straight, the curve of platform may be a little >, plural systems as in Fig.9 can be used.

If we use electromotive curtain as in Fig.27 or Fig.28, robot arm 26 as in Fig.10 becomes unnecessary.

In Fig.27 and Fig.28 , motor mechanism 75 of electromotive curtain drives the filmy things and fix it. Such motor 75 is controlled by cpu 5 which is on line connected to ATC or CTC. The movement of curtain 3 of these electromotive curtain system is controlled like means 1 in Fig.1 .

Filmy things of Fig.27 , Fig.28 is each supported by net of carbon fiber or beams of steel.

In Fig.27, we can use not only filmy things but also pure net of carbon fiber or net of flaxen string or for example tennis net. Poles 63, 64 of support is also curtain rail.

In the system as in Fig.27 , folded filmy things is neatly put below the ceiling of platform.

In the example as in Fig.28, structure of pole for support is simple , so a little cost down is possible.

The system as in Fig.27 , Fig.28 can even be used in the platform that is always crowded by passengers.

For there is no swing of filmy things in the system as in Fig.28 or Fig.27 unlike the system as in Fig.26, Fig.9 , further , up and down of the curtain can be done just beside the edge of the platform. For such electromotive curtain system has orbits for curtain 3 , namely , curtain rails 63 and 64.

Namely, good use of the space of platform can be made for passengers.

In the example as in Fig.27, Fig.28 , limit switch 11 or microswitch 11 is also used on the lower end of filmy things 3 as in Fig.26 for the purpose of the detection of man or baggages.

As in Fig.11, we can use another type present system.

In Fig.11, curtain rails 61 and 62 are set on the upper side of the platform ( i.e. beneath the ceiling ) and on the platform.

Also in above case, by the use of electromotive curtain , curtain 3 can be stretched around the platform and restored in a horizontal direction .Curtain driving motor 75 is used.

On the platform of Japanese railway, yellow projections are often set about 50 cm from the edge of the platform for blind person.

In the system of above type that the curtain moves horizontally, we can set the curtain rail 62 of lower side just by the projections on the platform. If so, the blind has few feeling of wrongness.

Curtain rail 61 of the upper side is set beneath the ceiling just above it.

If the curtain rail 62 of lower side is set just beside the edge of platform as in Fig.29, the blind has no feeling of wrongness. In Fig.29, filmy things is supported with beams 51 of steel.

As in Fig.30, folded filmy things is neatly put at the end of the platform .[ 54 is a folded filmy things 3 or curtain 3. ]

If curtain rail is set on the edge of platform so that the "mouth" of rail turns horizontal direction as in Fig.31, we can prevent that lower curtain rail 62 is heaped with dust. Even if a platform curves not a little, the system of above type as in Fig.11 or Fig.29 is suitable to the station that there is no wind like subway.

Also on the station of cable car or rope way in the mountain, present system is valid. For prevention of fall of passengers , in particular, the blind, from the platform becomes possible. As in Fig.11 or Fig.29 , limit switch 11 is set on the end of the curtain in above system.

So man or baggage can be detected.

If we use pure net curtain , the system can be used to the station that there is strong wind.

By the way, when pure net is used, special situation must be considered as follows.

In Fig.13 , one end of the pure net 3'' is connected to tension meter 41 or tension sensor 41 which is supported with stick 30. Means 1 can have means 2 built-in.

<In the following sentences, that is expressed as "means 31".>



Tension meter 41 is connected with cpu 5 in the means 31 by wire or wireless.

Means 31 has at least two motors.

One motor 73 is used for the rotation of winding axis on which net or filmy things is wound. [ For convenience, that is called motor 2]

Another motor 71 is used for horizontal movement on platform , namely, for the function of automatic carrier . [ That is also called motor 1] . When means 31 moves to stretch net 3'' , it is controlled like as in Fig.17 .

If we change "means 1" with "motor 1" and change "means 2" with "motor 2" in Fig.17 , the logic of Fig.17 can be used by cpu 5. When means 31 stops after the stretch of net 3'' , it is controlled like as in Fig.20 .

If net like filmy things is used on the above system , it becomes safer.

In the system as in Fig. 1 , filmy things 3 moves when means 1 carries it . That is to say, meshes of the filmy things 3 also moves if net like filmy things is used.

That means a danger to the child.

Because the children may thrust their fingers or hands or arms into the meshes of the filmy things and their effort for drawing their fingers or hands off may become impossible.

Namely, movement of meshes leads to danger.

However, in the system as in Fig.13 , meshes does not move.

When means 31 moves in the direction that the net is stretched around the platform, means 31 goes away from the child, even if a child thrust his hand into the net.

When means 31 moves in the direction that the net is wound back, means 31 approaches the child.

However, if means 31 touches the child at last moment, means 31 stops. Because limit switch 11' or touch sensor 11' operates.

Fig.32, Fig.33 is a similar application of above mechanism to the system of Fig.28, Fig.29.

In Fig.32, the system has at least two motors.

one motor 73 is used for the rotation of the axis 4 on which net or filmy things 3 is wound.

[For convenience, that is called motor 2'']

Another motor 75 is used for vertical movement of moving part 31' along the curtain rail 63, 64, for the function of electromotive curtain. [That is called motor 1'']

The moving part 31' comprises at least motor 73 and the axis 4 on which the net is wound on.

When means 31' moves up and down, it is controlled like Fig.17. If we change means 1 with motor 1'' and change means 2 with motor 2'', the logic of Fig.17 and Fig.20 can be used by cpu 5.

Moving part 31' goes up and down by the mechanism of electromotive curtain. At the same time, synchronizing the movement of up and down, net 3'' is wound off or wound back by motor 73. Therefore, net 3'' is stretched in the vertical direction in Fig.32.

In Fig.33, moving part 31' moves horizontally along the curtain rail which is set on the edge of platform and below the ceiling just above the edge. Synchronizing the horizontal movement, the net 3'' is also wound off or wound back.

Moving part 31' is equipped with at least two limit switch 11 and 11'' to detect man or baggage.

Considering the case that man thrusts his fingers or thin belongings, second limit switch 11'' is used. It is, in particular, necessary when moving part 31' goes back.

In a subway or the place where there is no wind  
or the place where consideration about wind  
pressure by train is not necessary < namely, in the station that  
every train always stops >, simple electromotive curtain system  
as in Fig.27, Fig.28 and Fig.29 will do and cheaper.

[In the system of Fig.27, vinyl sheet or nylon sheet enforced by  
net, for example carbon fiber net, is used. ]

In the station that consideration for wind pressure by passing  
train is necessary or in the place where there is a strong wind,  
not filmy things but pure net is better. In such case, the  
system as in Fig.32 or Fig.33 is used. See also Fig.13 .  
Considering the safety, we had better set limit switch < or  
touch sensor > 11, 11' to the front and rear side of means 31. (We  
had best set limit switch 11'' even to side surface of means  
31. Fig.14). Such equipment can also be made on means 1 or  
means 1' in Fig.1, Fig.3 .

By the way, infrared sensor 38 and 38' can be set on the top of  
the means 31 as in Fig.14 for easier detection of man.  
Of course, we had better set it also means 1 and means 1'.  
Fig.1, Fig.3 .

If a man approaches means 31, he is detected by the infrared  
sensor 38 or 38', even if he does not touch the limit switch 11.  
In such case, the announcement "Please step back" is done by the  
unit 9 under the cpu 5.

If the man is detected by the infrared sensor 38 or 38' ; the  
system can also lower the velocity of means 31 under the control  
of cpu 5. Such system becomes safer.

If the intensity of the signal of infrared sensor or other human  
detection sensor becomes large, cpu 5 can recognize that man  
approaches means 31.

In this way, cpu 5 can lower the velocity of means 31.

Above function can be programmed into cpu 5.

Television camera 39 can be set on the means 31. Station  
employee on remote site can catch the sight around the means 31.

Such television camera 39 can be rotated , if it is set on the top surface of means 31 by journal and the motor for its rotation .

When man or bagages is detected, in particular , on the direction of the movement of means 31, the scenery caught by television camera can be transfered to the room of station master or the center of the centralized traffic control system. It is embodied by the online connection of infrared sensor 38,38' and television camera 39 under the control of cpu 5. Please see Fig.34 .

In Fig.17 or Fig.20 , if tention value goes to zero , it means that something is wrong with present system. For example, a damage of filmy things 3 , a breakdown of tension meter 41 or a trouble of the wire between components of this system.

In such case, the situation is tranferred to the room of station employee or the center of CTC.

If the tention value of tension meter 41 approaches the theshold value that filmy things 3 is torn off < such threshold value is larger than "pre-set max value " >, the situation is also transferred to the room of station employee.

In Fig.17 , the control of tension on the filmy things 3 is done mainly by means 2. That is to say, cpu 5 controls mainly the movement of the motor 73 in means 2. For the movement of means 1 should be done , as it is, as quickly as possible to reach the end of the platform.

However, as in Fig.34, means 1 is controlled by cpu 5 when the movement of means 1 relates to passengers.

Fig.35 shows a schematic diagram of present invention.

Describing more detail about Fig.35, when robot arm or robot hand is used , such robot device is also connected to cpu 5.

#### Industrial availability

Around the platform,present invention can stretch the filmy things 3 that isolates the passengers on a platform from a train which passes through the station with high speed.So present invention gives a safety to the passengers.

## CLAIMS

## Claim 1.

Safety device for a passenger on a platform , comprising  
filmy things 3 ,

means 1 for carrying said filmy things 3 ,

said means 1 having a motor 71 and wheels 72 ,

said means 1 stretching said filmy things 3 around a platform,  
means 2 that has said filmy things 3 within ,

and a central processing unit 5 < cpu 5 > ,

wherein means 1 is equiped with limit switch 8

and a signal of said limit switch 8 is transfered to said  
cpu 5 and an orbit of means 1 is controlled by cpu 5 so that  
means 1 does not fall down said platfarm ,

wherein means 1 is equipped with a tension meter 41 which is  
connected to one end of said filmy things 3 ,

wherein means 2 is equipped with a motor 73 and said filmy  
things 3 is wound on an axis 4 of said motor 73 ,

wherein cpu 5 is on line connected to said motor 71 and said  
motor 73 and gives a signal "On" or "off" to said motor 71 and  
said motor 73 at the same time so that said means 1 goes ahead ,  
synchronizing a rotation of said means 2 ,

wherein cpu 5 is on line connected to tension meter 41 and  
controls movements of means 1 and means 2 so that a tension  
detected by said tension meter 41 keeps values between 20~40 or  
40 ~ 80 kg

## Claim 2.

Safety device for a passenger on a platform according to Claim 1  
wherein said means 1 is an unmanned automatic carrier or an  
unmanned car of automated material handling system.

## Claim 3.

Safety device for a passenger on a platform  
according to Claim 2

wherein a set time schedule of trains is programmed into said  
cpu 5 ,

wherein said cpu 5 is connected on line to automatic train

control system < ATC > or centralized traffic control system < CTC >.

Claim 4.

Safety device for a passenger on a platform according to Claim 3 wherein means 1 is a stick 13 with a limit switch 11 and tension of said filmy things 3 is given by gravity of said stick 13 and said filmy things 3 moves up and down by rotation of said motor 73, being guided by pole 53 .

Claim 5.

Safety device for a passenger according to Claim 3 wherein said means 2 is built-in in a body of said means 1 and said filmy things 3 is connected to said tension meter 41 which is supported with stick 30 that is fixed vertically on said platform.

## Claim 6.

Safety device for a passenger on a platform , comprising  
filmy things 3 ,  
curtain driving motor 75,  
said cpu 5,  
wherein said cpu 5 is online connected to automatic train  
control system < ATC > or centralized traffic control system  
< CTC > and gives a signal "Open filmy things 3" or "Close filmy  
things 3" to said curtain driving motor 75 according to a signal  
from said ATC or said CTC.

## Claim 7.

Safety device for a passenger on a platform according to Claim 6  
wherein said filmy things 3 moves horizontally, being supported  
with lower curtain rail 62 on a platform and upper curtain rail  
61 beneath a ceiling of platform.

## Claim 8.

Safety device for a passenger on a platform according to Claim 6  
wherein said filmy things 3 moves up and down , being supported  
with left side curtain rail 63 and right side curtain rail 64,  
wherein said left side curtain rail 63 and right side curtain  
rail 64 are fixed vertically on said platform.

## Claim 9.

Safety device for a passenger on a platform according to Claim 8  
wherein one end of said filmy things 3 is wound on said axis 4  
which is rotated by said motor 73 ,  
wherein a rotation of said motor 73 sy<sup>n</sup>chronizes a movement of  
said curtain driving motor 75 under a control of said cpu 5.

## AMENDED CLAIMS

[received by the International Bureau on 12 December 1996 (12.12.96);  
original claims 1-9 replaced by new claims 1-18 (5 pages)]

## Claim 1.

Safety device for a passenger on a platform , comprising  
filmy things 3 ,  
means 1 for carrying said filmy things 3 ,  
said means 1 having a motor 71 and wheels 72 ,  
means 2 that has said filmy things 3 within ,  
and a central processing unit 5 < cpu 5 > ,  
wherein means 2 is equipped with a motor 73 and said filmy  
things 3 is wound on an axis 4 of said motor 73 ,  
wherein cpu 5 is on line connected to said motor 71 and said  
motor 73 and gives a signal "On" or "off" to said motor 71 and  
said motor 73 at the same time so that said means 1 goes ahead ,  
synchronizing a rotation of said means 2 .

## Claim 2.

Safety device for a passenger on a platform according to Claim 1  
wherein means 1 is equipped with limit switch 8  
and a signal of said limit switch 8 is transferred to said  
cpu 5 and an orbit of means 1 is controlled by cpu 5 so that  
means 1 does not fall down said platform  
and said filmy things 3 is stretched around a platform by said  
means 1 .

## Claim 3.

Safety device for a passenger on a platform  
according to Claim 1  
wherein means 1 is equipped with a tension meter 41 which is  
connected to one end of said filmy things 3 ,  
wherein cpu 5 is on line connected to tension meter 41 and  
controls movements of means 1 and means 2 .

## Claim 4.

Safety device for a passenger on a platform  
according to Claim 3 wherein cpu 5  
controls movements of means 1 and means 2 so that a tension  
detected by said tension meter 41 keeps values between 20~40kg  
or 40~80kg .



Claim 5.

Safety device for a passenger on a platform  
according to Claim 3

wherein means 1 is equipped with limit switch 8  
and a signal of said limit switch 8 is transferred to said  
cpu 5 and an orbit of means 1 is controlled by cpu 5 so that  
means 1 does not fall down said platform and said  
filmy things 3 is stretched around a platform by said means 1.

Claim 6.

Safety device for a passenger on a platform  
according to Claim 4

wherein means 1 is equipped with limit switch 8  
and a signal of said limit switch 8 is transferred to said  
cpu 5 and an orbit of means 1 is controlled by cpu 5 so that  
means 1 does not fall down said platform and said  
filmy things 3 is stretched around a platform by said means 1.

Claim 7.

Safety device for a passenger on a platform according to Claim 5  
wherein said means 1 is an unmanned automatic carrier or an  
unmanned car of automated material handling system.

Claim 8.

Safety device for a passenger on a platform according to Claim 7 wherein a set time schedule of trains is programmed into said cpu 5.

Claim 9.

Safety device for a passenger on a platform according to Claim 7 wherein said cpu 5 is connected on line to automatic train control system < ATC > or centralized traffic control system < CTC >.

Claim 10.

Safety device for a passenger on a platform according to Claim 9 wherein a set time schedule of trains is programmed into said cpu 5.

Claim 11.

Safety device for a passenger on a platform according to Claim 7 wherein means 1 is a stick 13 provided with a limit switch 11 and tension of said filmy things 3 is given by gravity of said stick 13 and said filmy things 3 moves up and down by rotation of said motor 73, being guided by pole 53 .

Claim 12.

Safety device for a passenger according to Claim 7 wherein said means 2 is built-in in a body of said means 1 and said filmy things 3 is connected to said tension meter 41 which is supported with stick 30 that is fixed vertically on said platform.

Claim 13.

Safety device for a passenger on a platform , comprising  
filmy things 3 ,  
curtain driving motor 75,  
and a central processing unit 5 < cpu 5 > ,  
wherein said cpu 5 is online connected to automatic train  
control system < ATC > or centralized traffic control system  
< CTC > and gives a signal "Open filmy things 3" or "Close filmy  
things 3" to said curtain driving motor 75 according to a signal  
from said ATC or said CTC.

Claim 14.

Safety device for a passenger on a platform  
according to Claim 13  
wherein said filmy things 3 moves horizontally, being supported  
with lower curtain rail 62 on a platform and upper curtain rail  
61 beneath a ceiling of platform.

Claim 15.

Safety device for a passenger on a platform  
according to Claim 13  
wherein said filmy things 3 moves up and down , being supported  
with left side curtain rail 63 and right side curtain rail 64,  
wherein said left side curtain rail 63 and right side curtain  
rail 64 are fixed vertically on said platform.

Claim 16.

Safety device for a passenger on a platform  
according to Claim 15  
wherein one end of said filmy things 3 is wound on said axis 4  
which is rotated by said motor 73 ,  
wherein a rotation of said motor 73 synchronizes a movement of  
said curtain driving motor 75 under a control of said cpu 5.

Claim 17.

Safety device for a passenger on a platform  
according to Claim 14

wherein one end of said filmy things 3 is wound on said axis 4  
which is rotated by said motor 73,  
wherein a rotation of said motor 73 synchronizes a movement of  
said curtain driving motor 75 under a control of said cpu 5.

Claim 18.

Safety device for a passenger on a platform  
according to Claim 13

wherein a set time schedule of trains is programmed into said  
cpu 5.

**STATEMENT UNDER ARTICLE 19**

It seems that there is no impact on the description and the drawings under present amendments.

From the grammatical point of view,  
the fifth line of Claim 1 in original disclosure  
is amended like  
the seventh line of new Claim 5 after amendments.

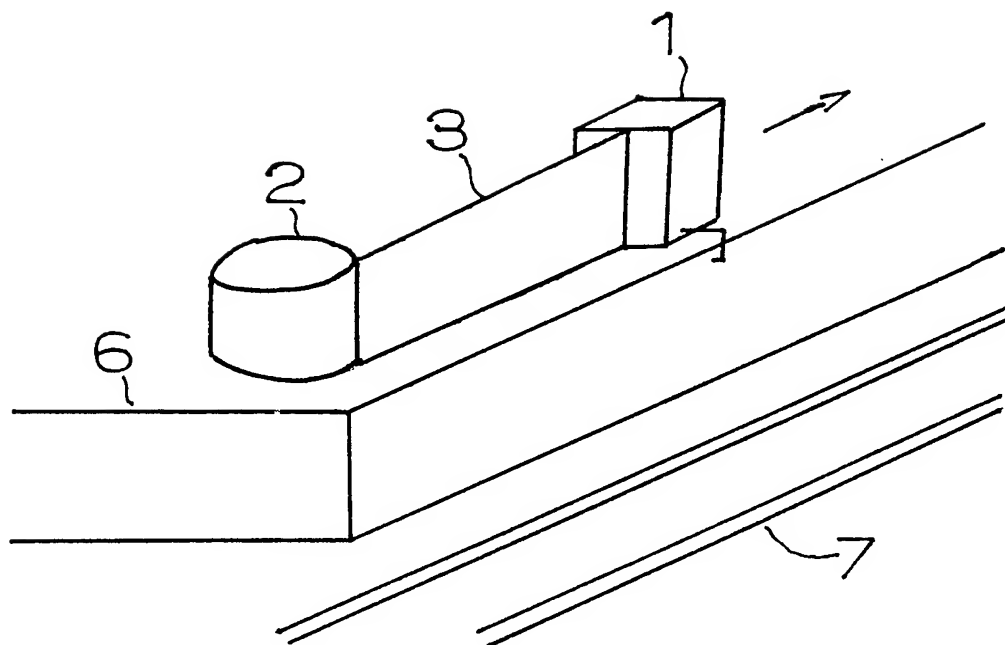


Fig.1

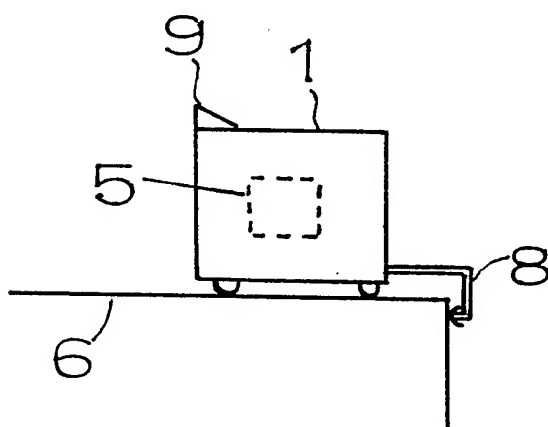


Fig.2

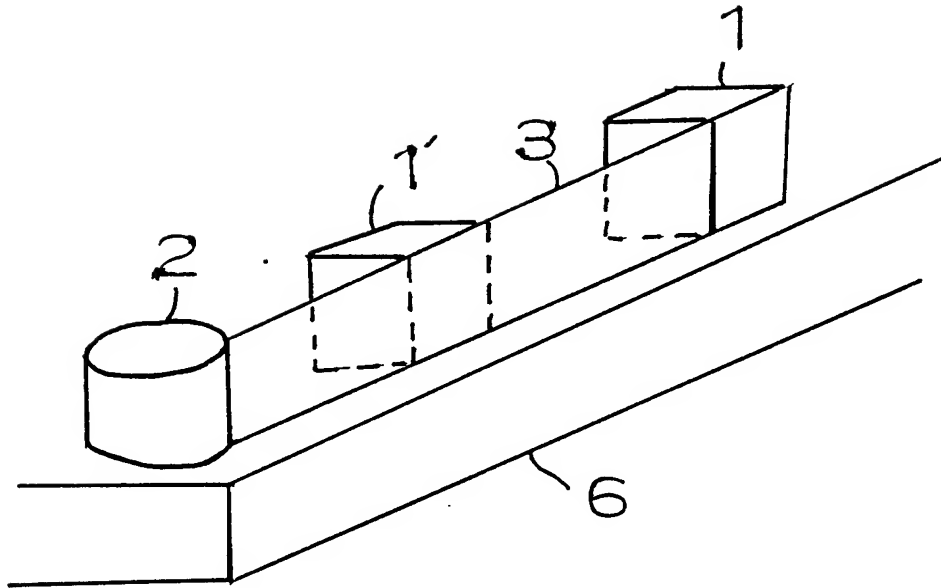


Fig. 3

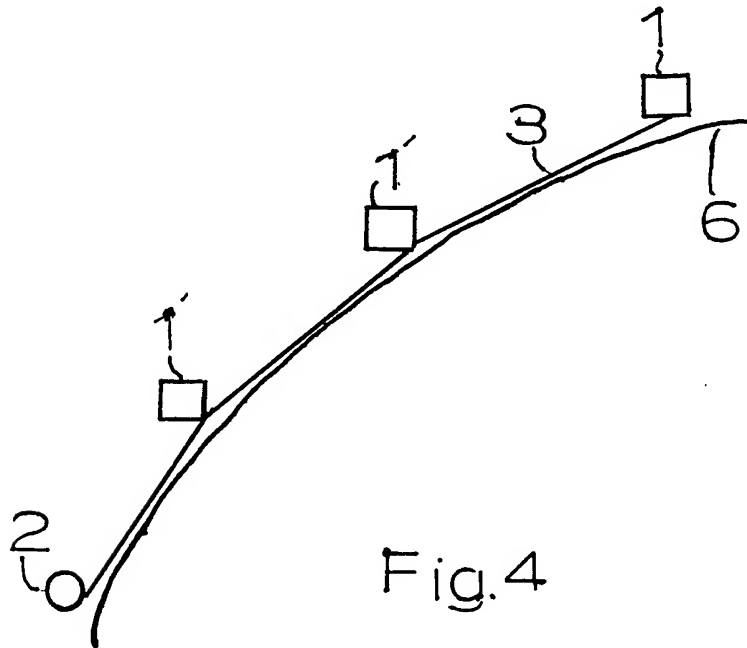


Fig. 4

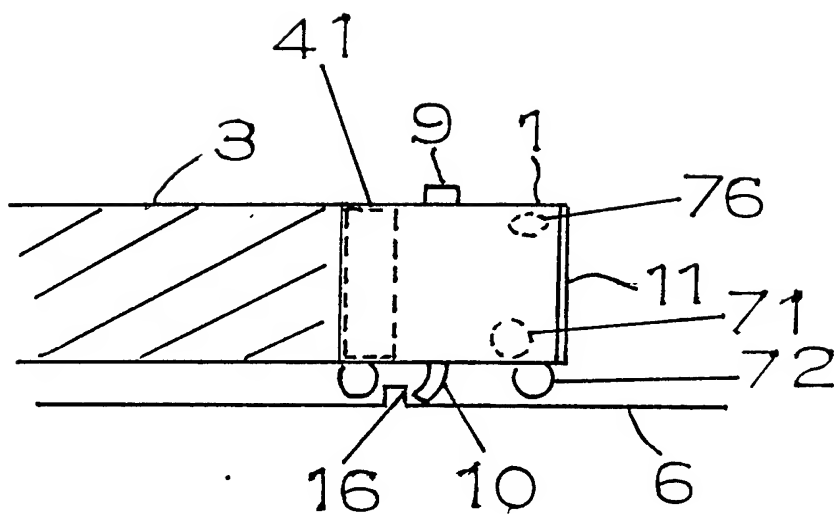


Fig. 5

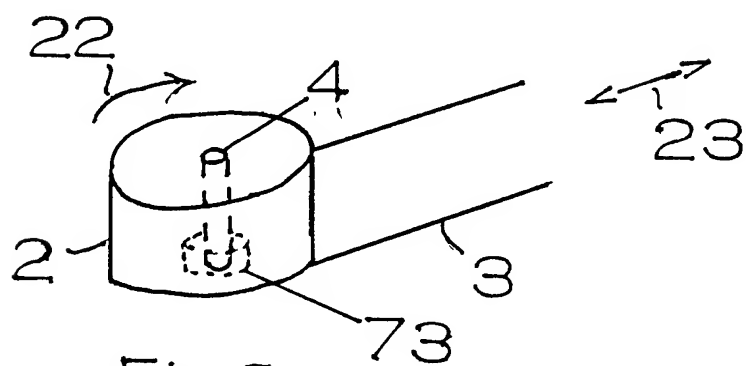


Fig. 6

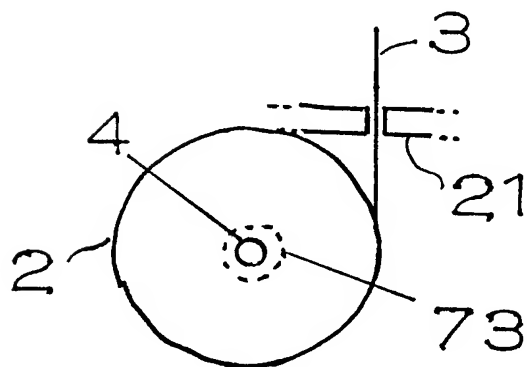


Fig. 7

3/20



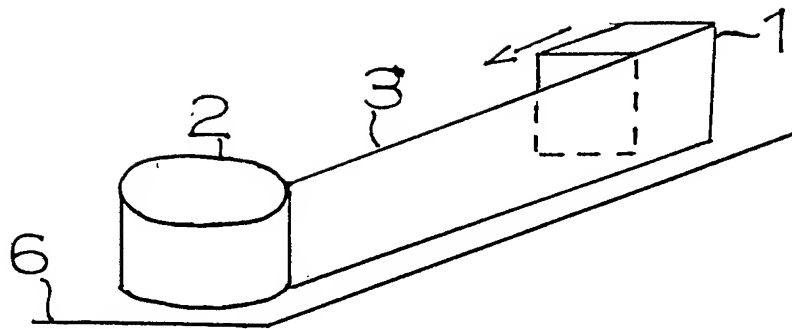


Fig. 8

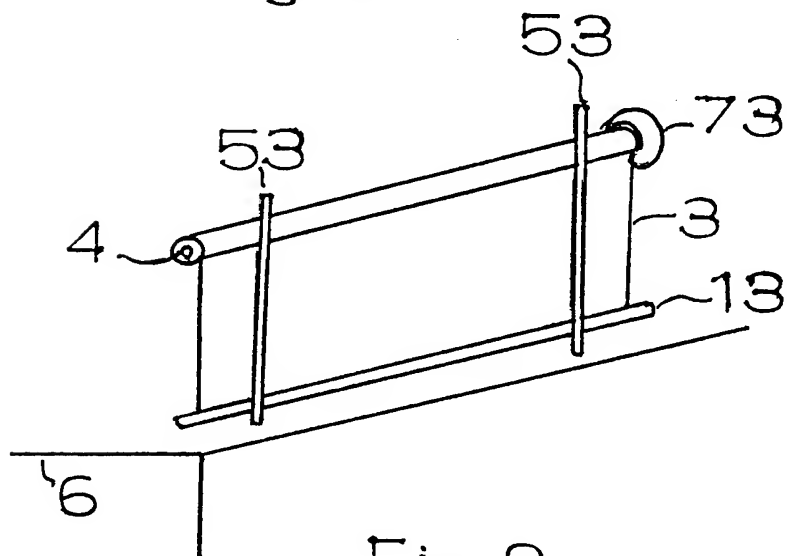


Fig. 9

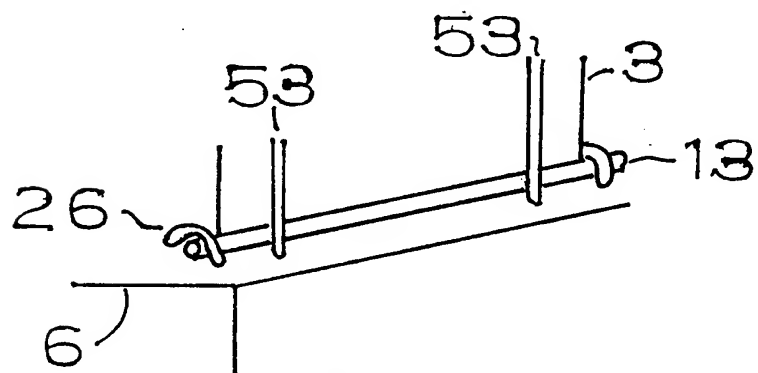


Fig. 10

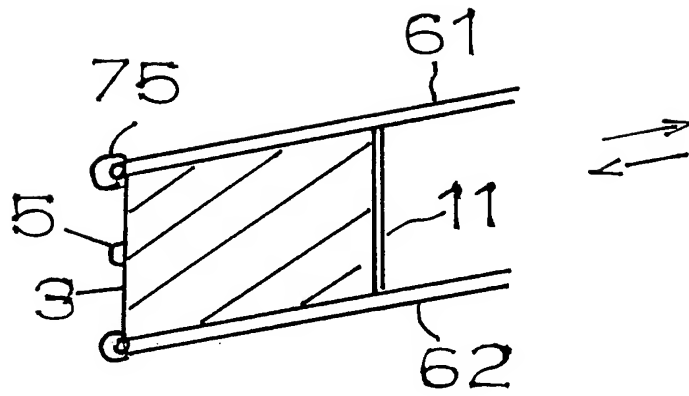


Fig.11

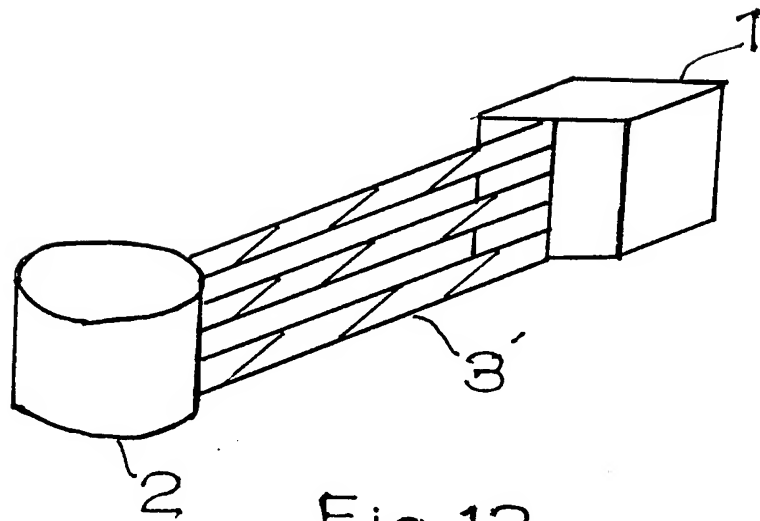


Fig.12

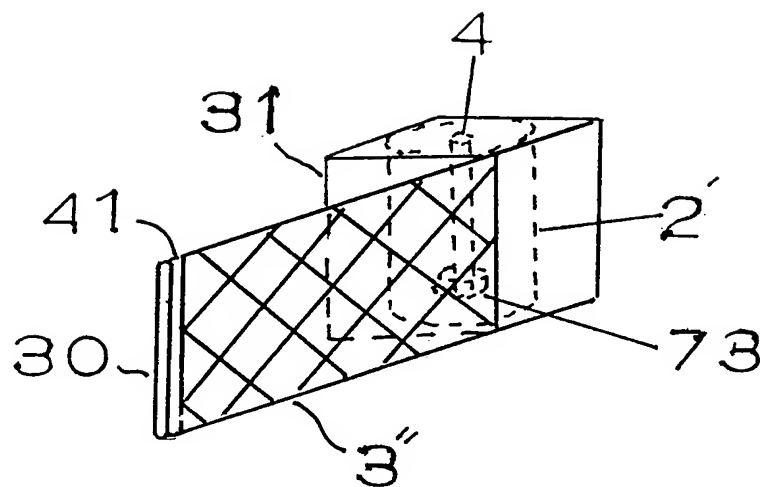


Fig.13

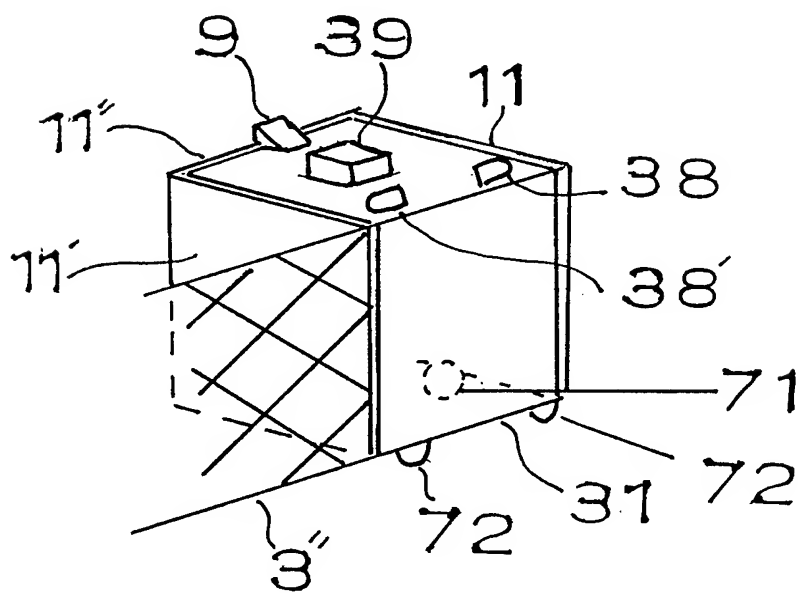


Fig.14

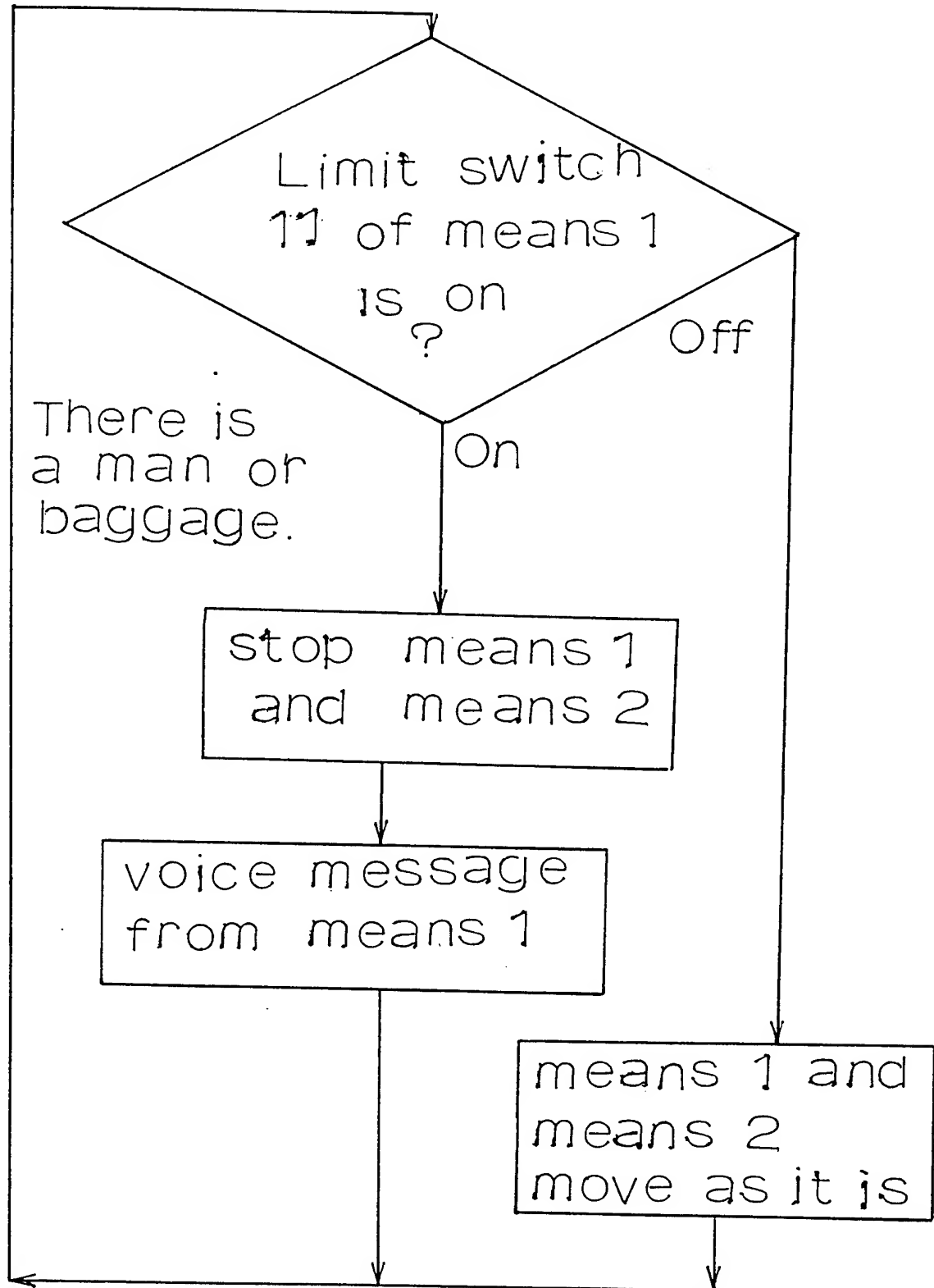


Fig.15

7/20

SUBSTITUTE SHEET (RULE 26)

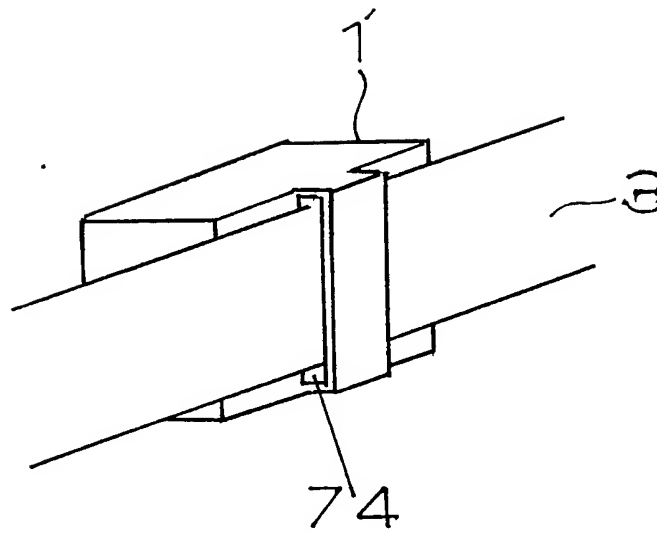


Fig. 16

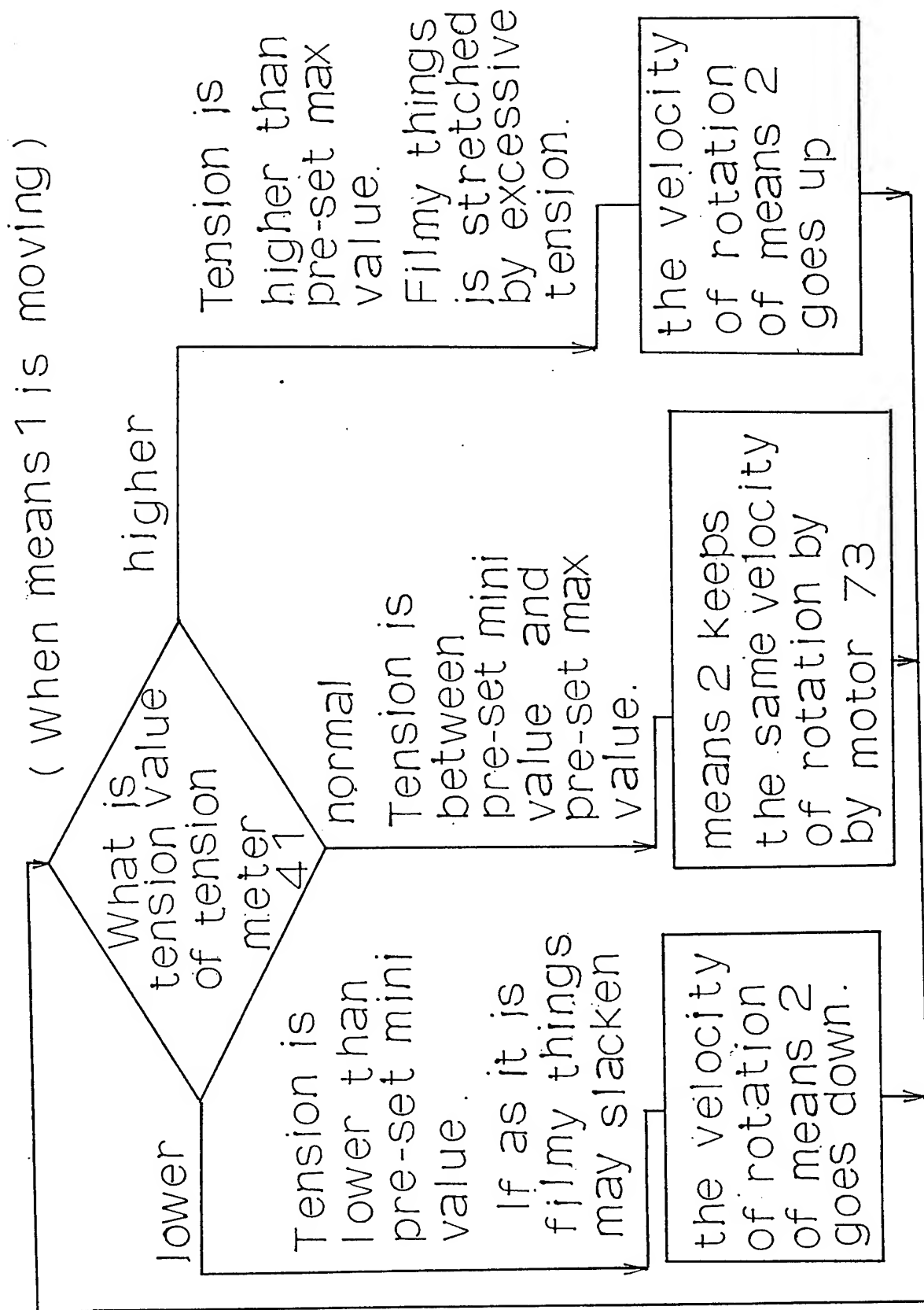


FIG.17

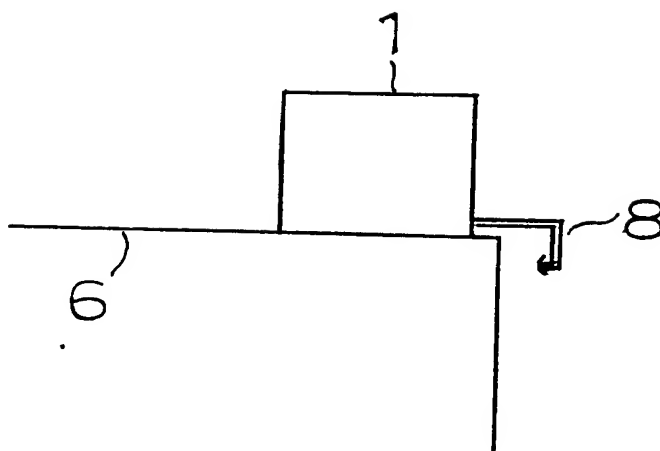


Fig.18

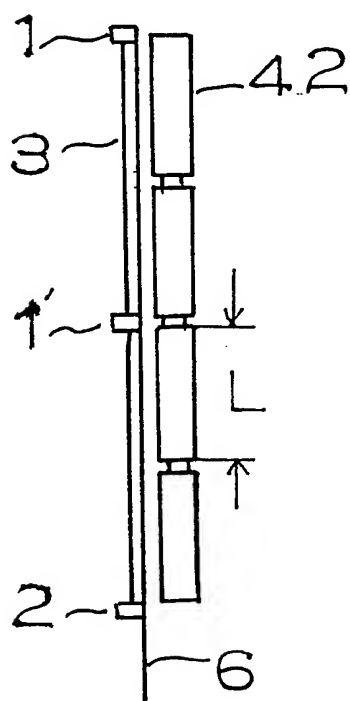


Fig.19

10/20

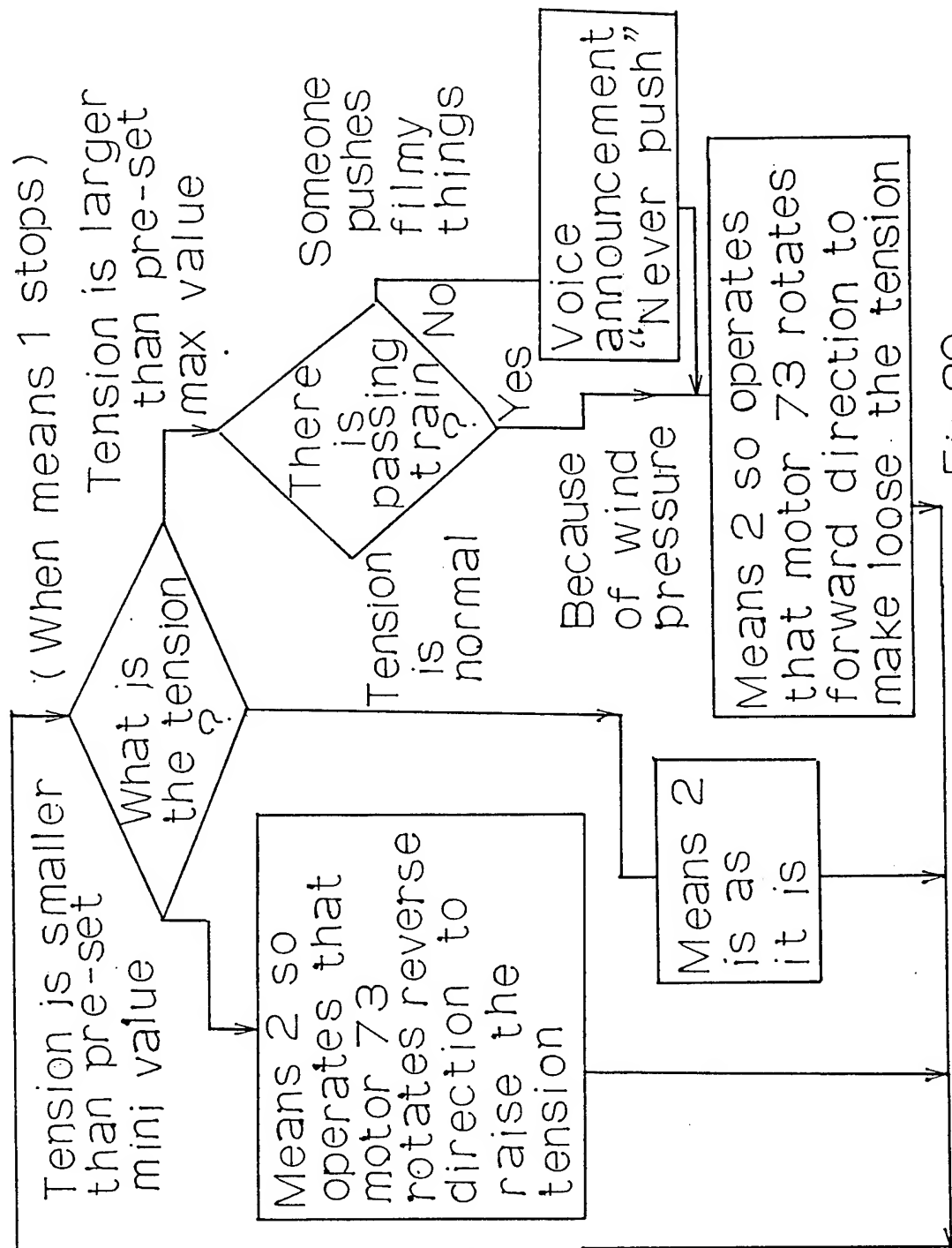


Fig. 20



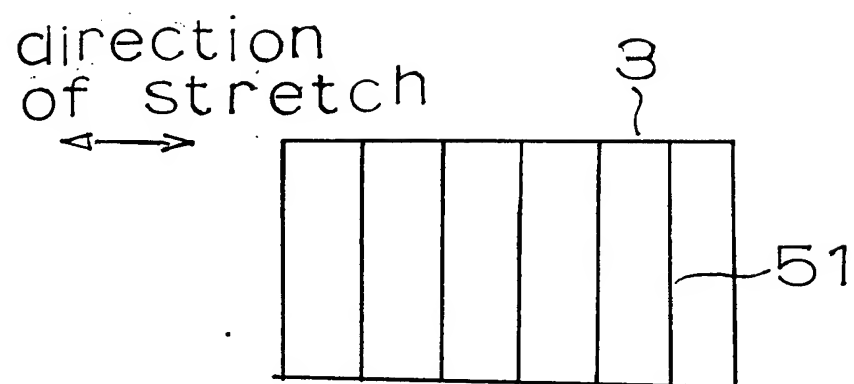


Fig. 21

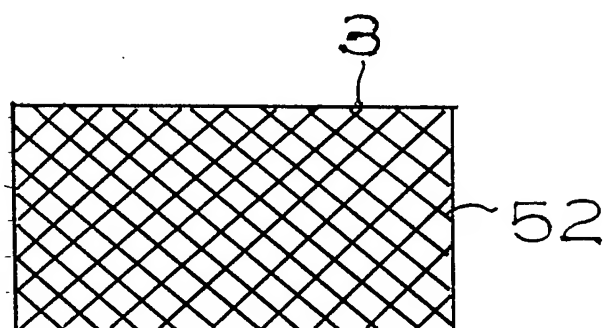


Fig. 22

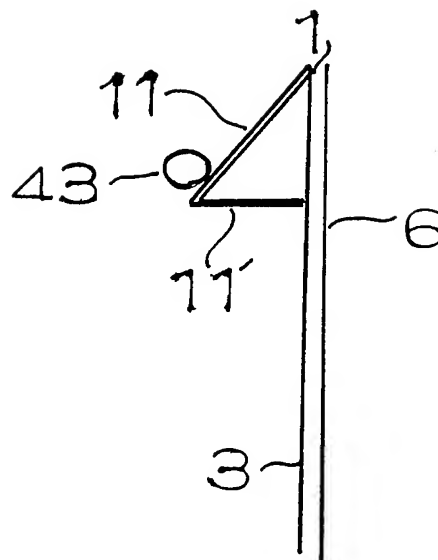


Fig. 23

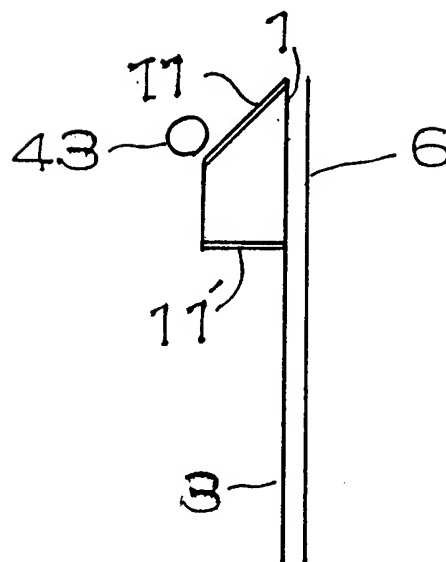


Fig. 24

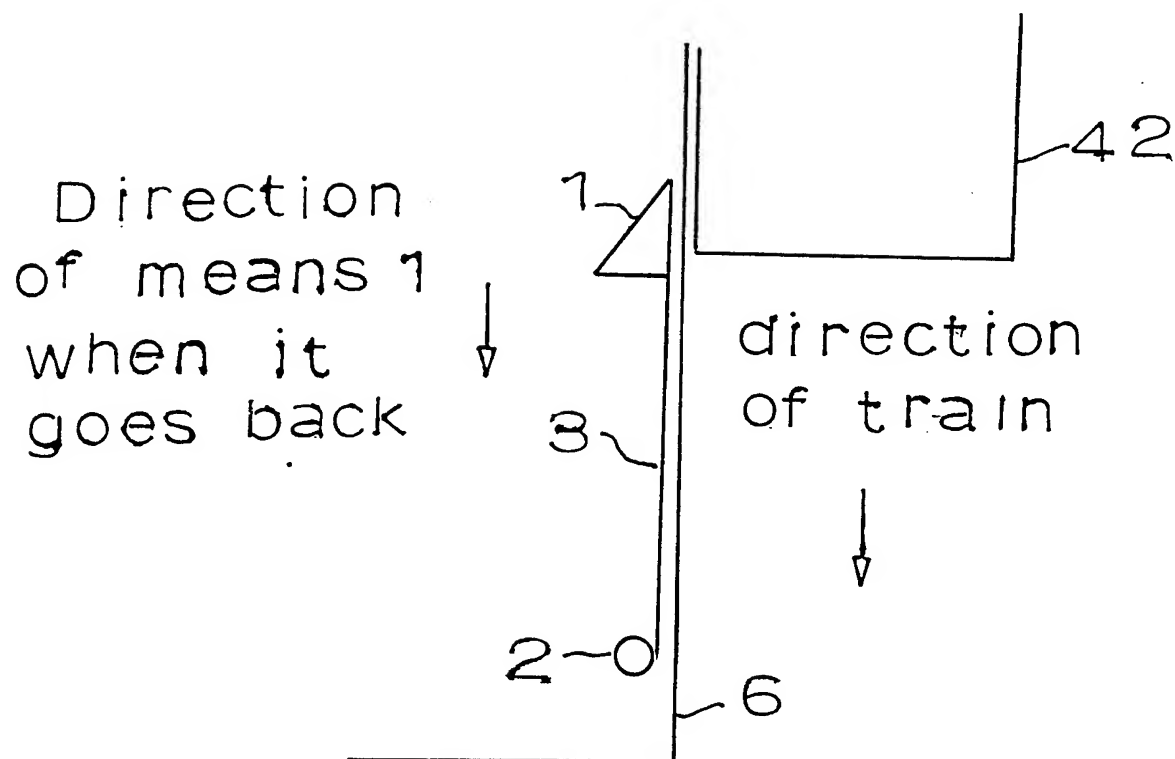


Fig. 25

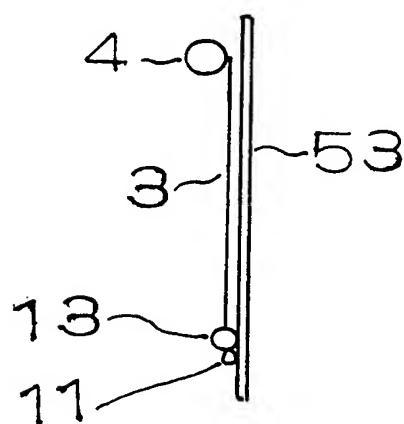
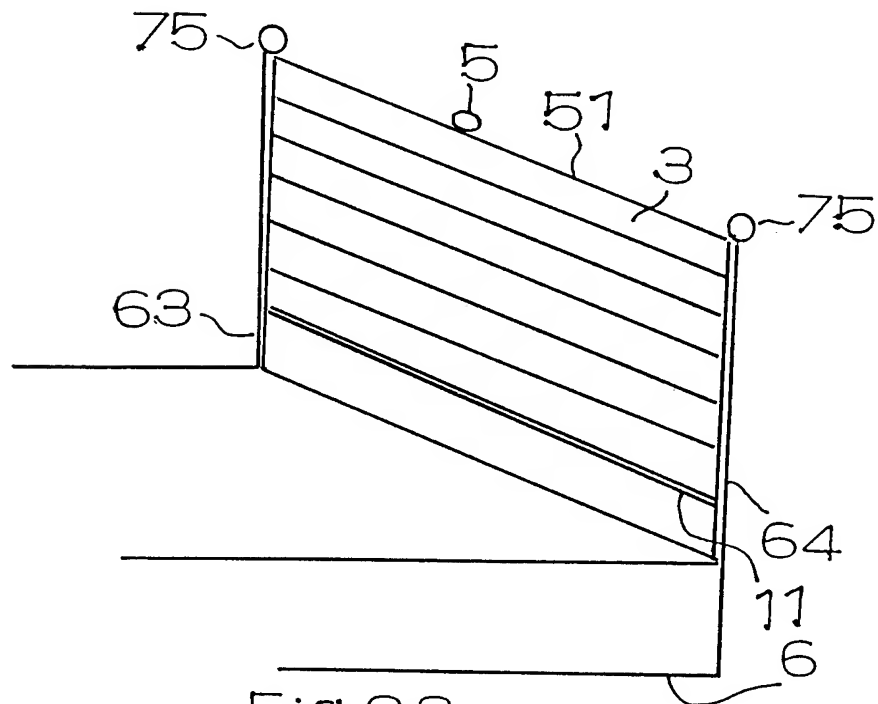
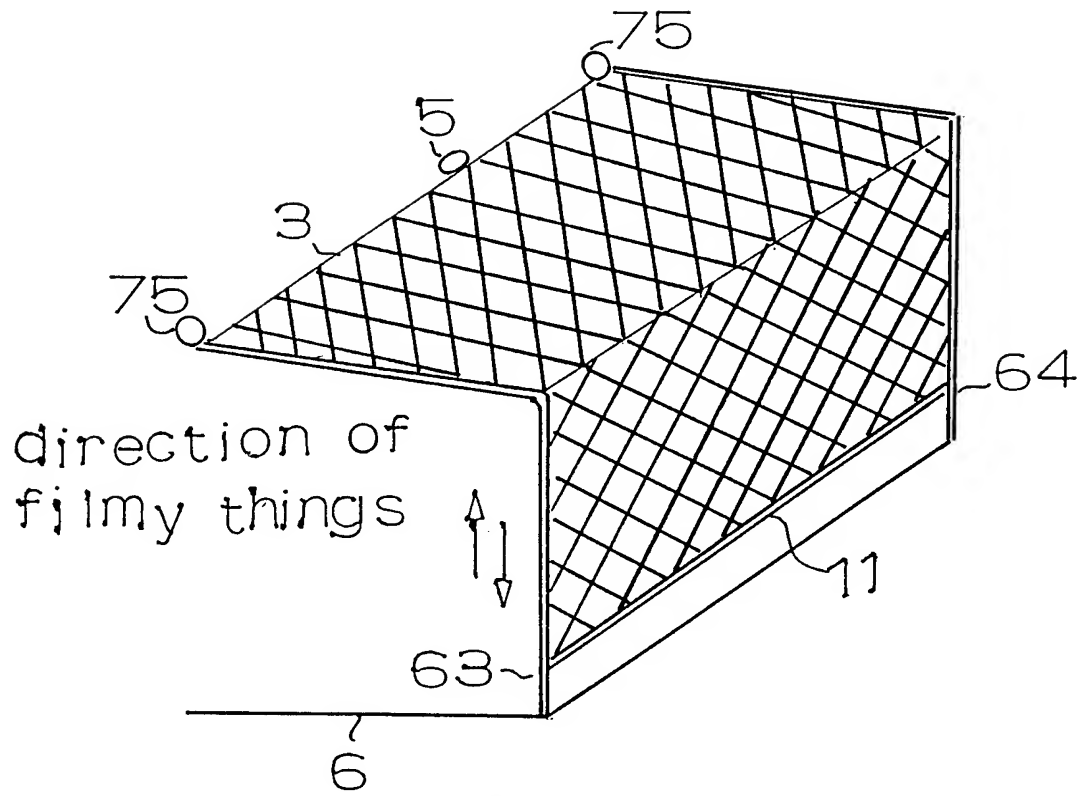
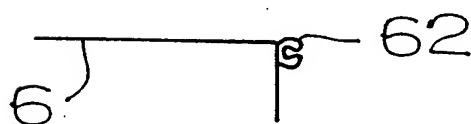
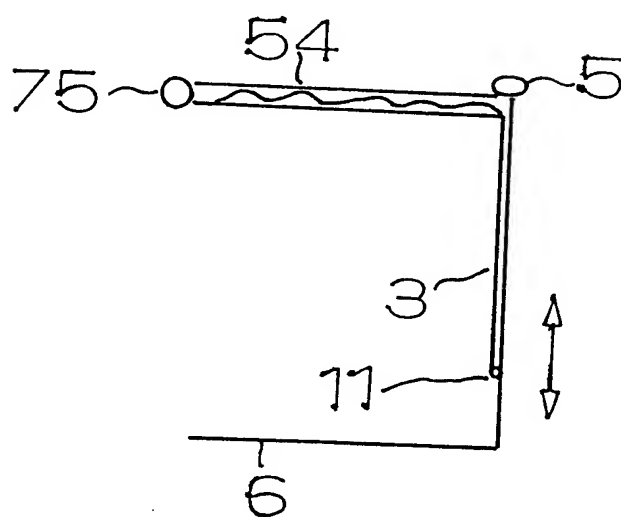
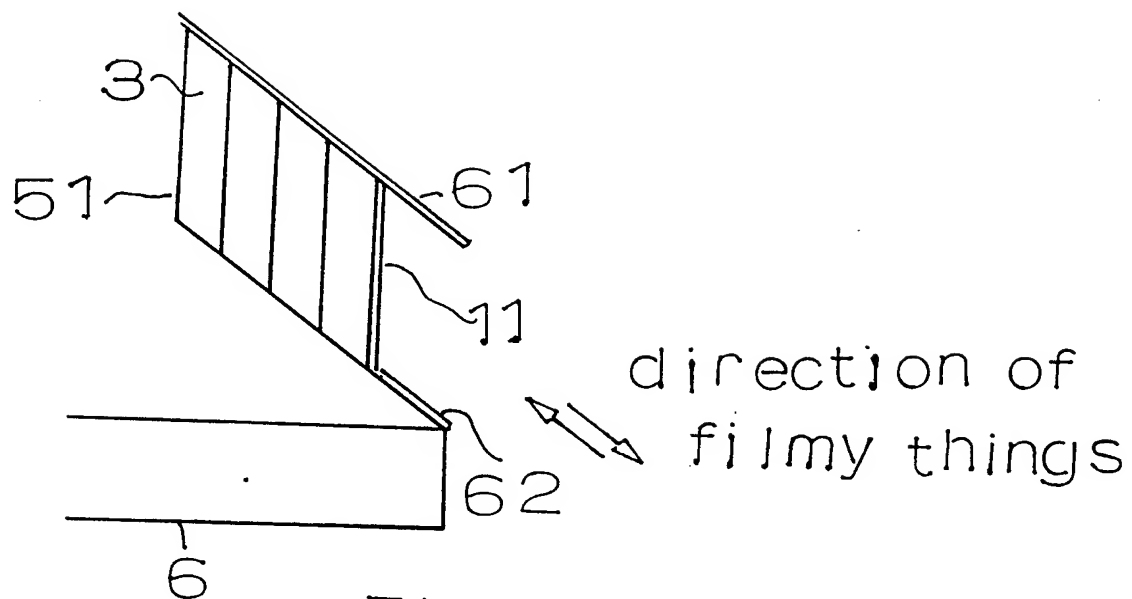


Fig. 26

18 / 20

SUBSTITUTE SHEET (RULE 26)





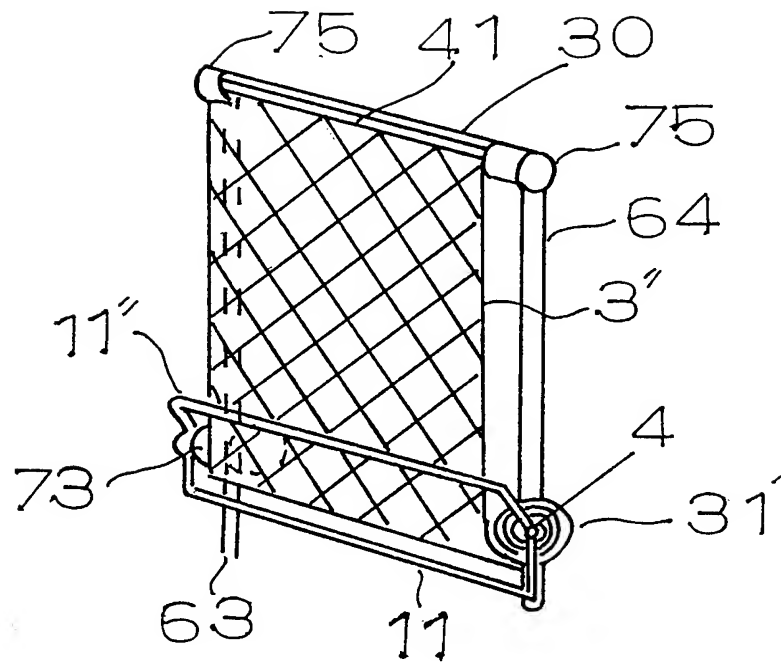


Fig. 32

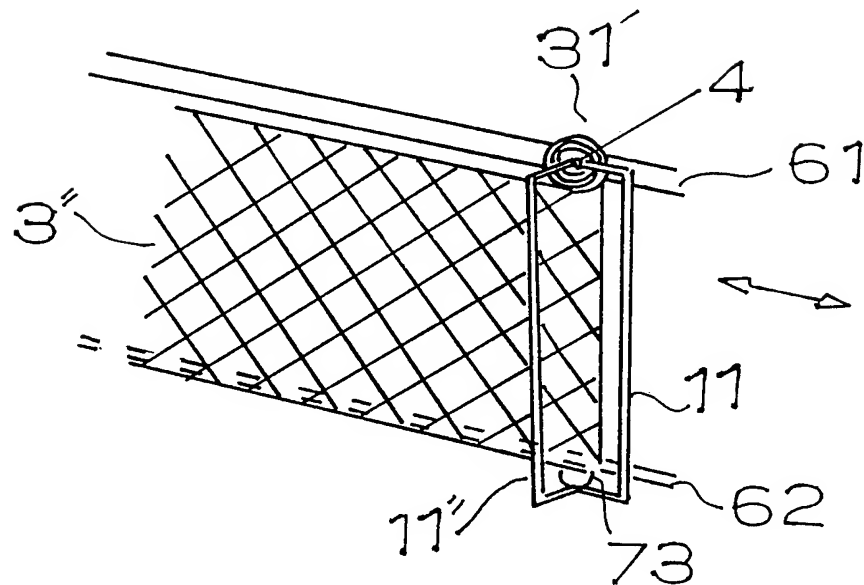


Fig. 33

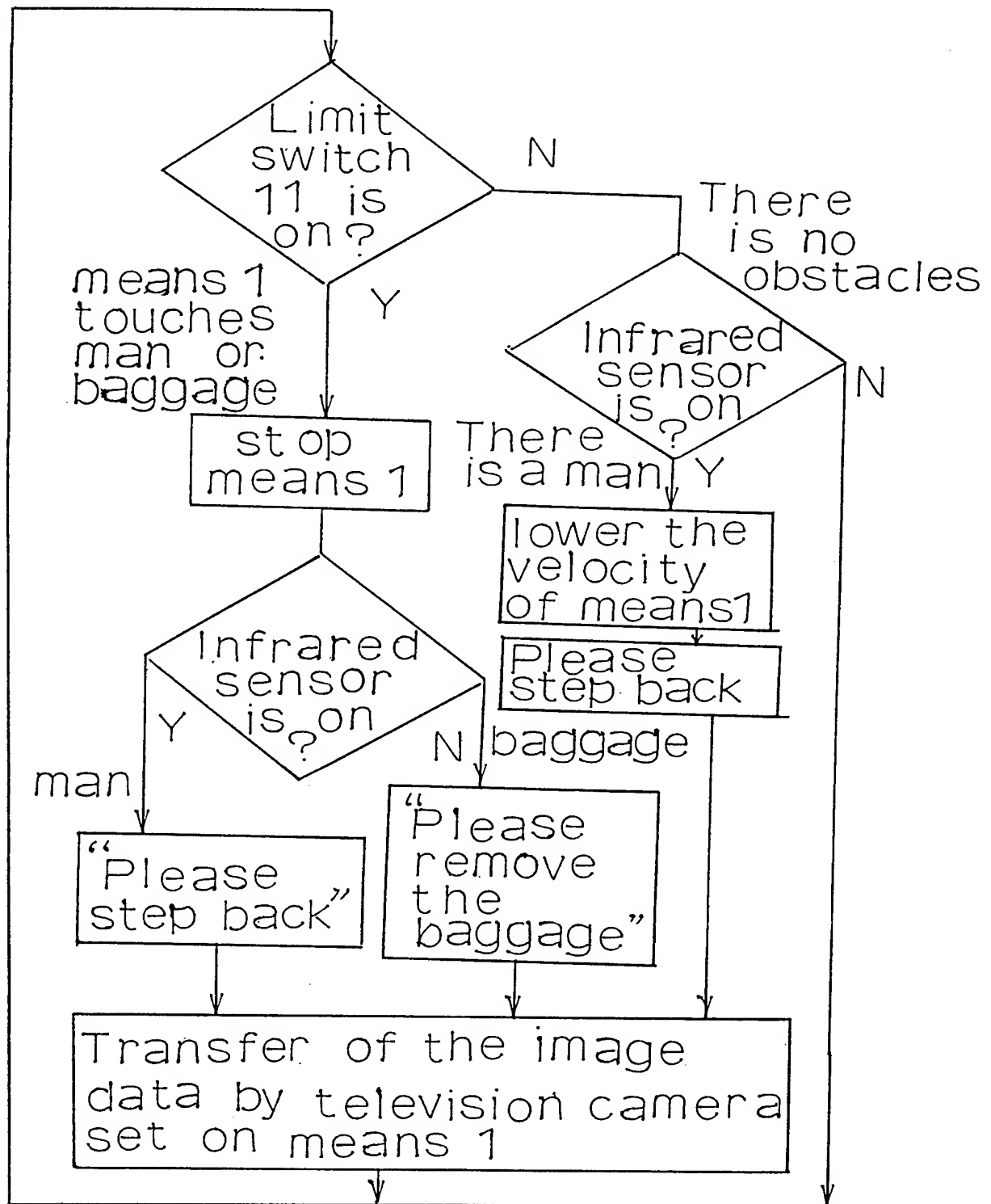


Fig.34

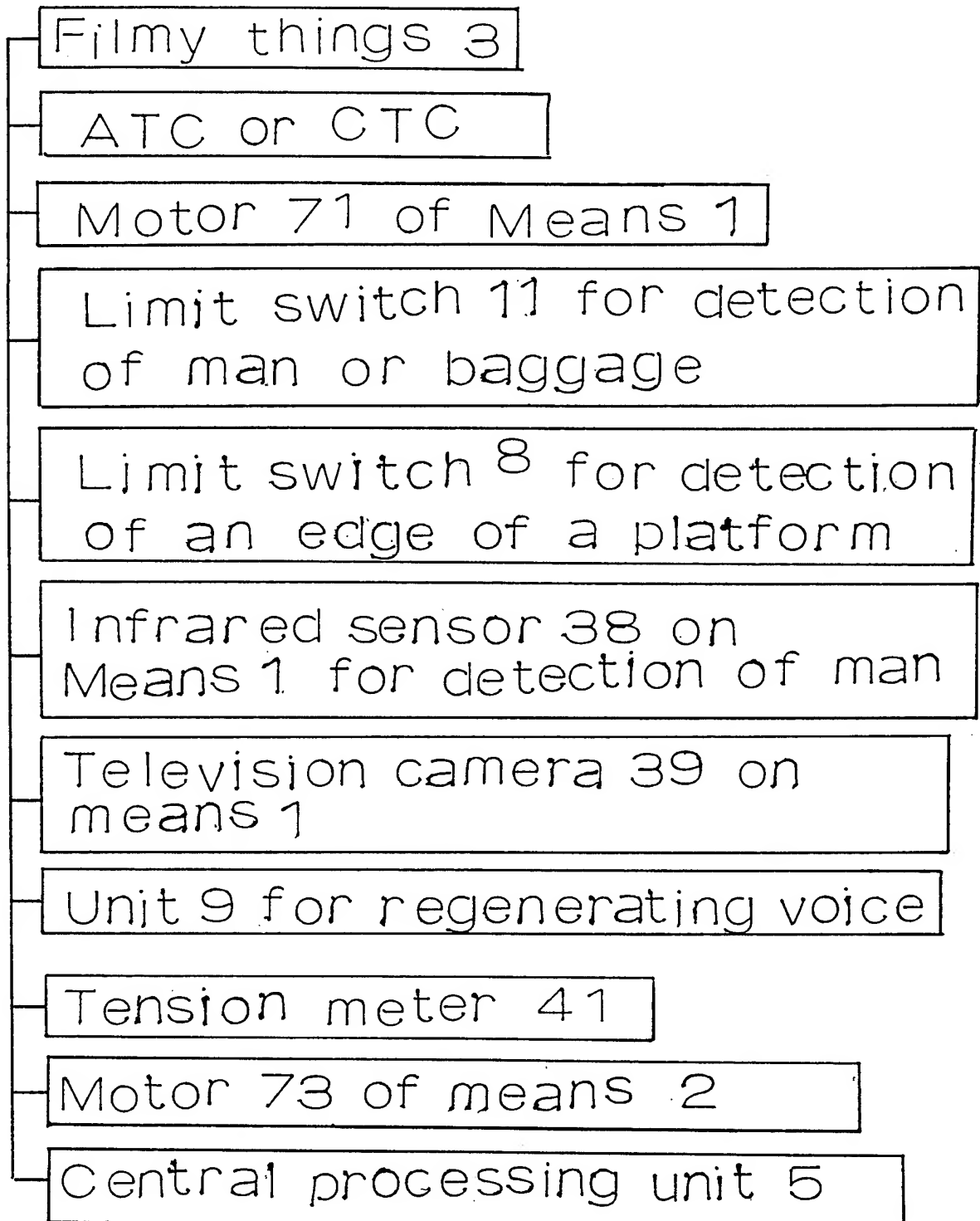
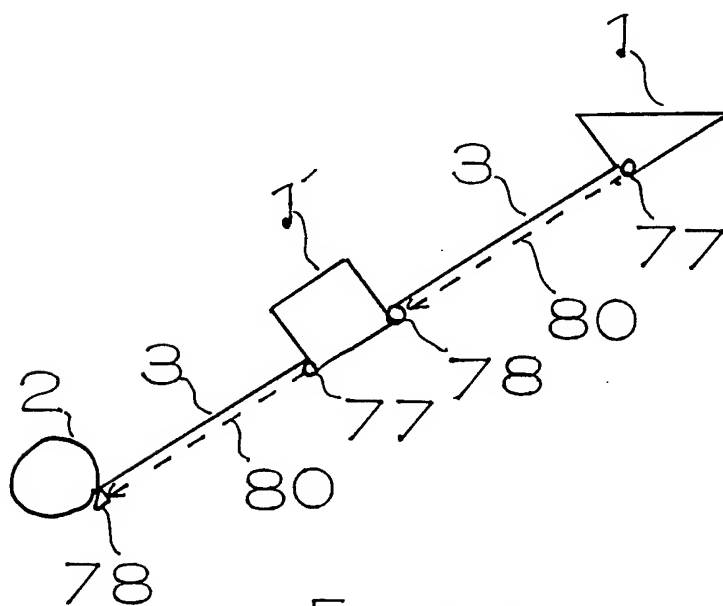
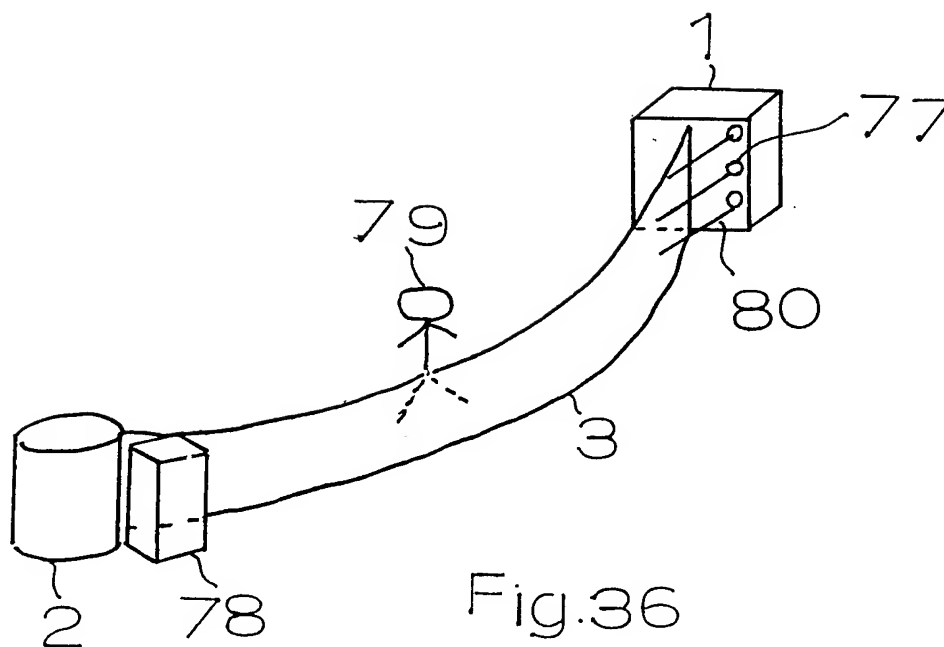


Fig. 35





# INTERNATIONAL SEARCH REPORT

Int. onal Application No  
PCT/JP 96/02306

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 6 B61B1/02

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B61B B61L B61K E01F E06B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE,U,92 11 206 (SIEMENS AG) 29 October 1992 see page 3, line 30 - page 5, line 18; figures 1-3	1,6,8
A	GB,A,748 067 (ALWEG - FORSCHUNG GMBH) 18 April 1956 see page 2, line 126 - page 3, line 33; figures 9-12	1,6,8
A	US,A,1 486 453 (J. RABB) 11 March 1924 see the whole document	1,6,8

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents :

- \* "A" document defining the general state of the art which is not considered to be of particular relevance
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- \* "O" document referring to an oral disclosure, use, exhibition or other means
- \* "P" document published prior to the international filing date but later than the priority date claimed

- \* "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \* "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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- \* "&" document member of the same patent family

Date of the actual completion of the international search

21 November 1996

Date of mailing of the international search report

26. 11. 96

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Chlosta, P

# INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No

PCT/JP 96/02306

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-U-9211206	29-10-92	NONE	
GB-A-748067		DE-C- 936145 FR-A- 1112175	09-03-56
US-A-1486453	11-03-24	NONE	